

From THE DEPARTMENT OF PUBLIC HEALTH SCIENCES
Karolinska Institutet, Stockholm, Sweden

CLOSING THE QUALITY GAP

Investigating health system bottlenecks and quality improvement
strategies for maternal and newborn care in Sub Saharan Africa,
focusing on Tanzania

Ulrika Baker



**Karolinska
Institutet**

Stockholm 2017

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Front page photo: Batik by Ulrika Baker

Published by Karolinska Institutet.

Printed by Eprint AB 2017

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ISBN 978-91-7676-641-5



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Institutet**

Department of Public Health Sciences, Global Health

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Investigating health system bottlenecks and quality improvement strategies for maternal and newborn care in Sub Saharan Africa, focusing on Tanzania

THESIS FOR DOCTORAL DEGREE (Ph.D.)

By

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Public Defence

Friday 21st of April, 2017 at 9:00

Inghesalen, Tomtebodavägen 18A, Karolinska Institutet

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For Tim, Alva and Frida – you are my happiness

ABSTRACT

BACKGROUND: Despite substantial gains in survival in the past three decades, around 200,000 maternal deaths, 1 million newborn deaths and 1 million stillbirths occur annually in Sub Saharan Africa (SSA). The majority of these could be averted by effective medical interventions, but implementation in the context of under-resourced health systems is a challenge. The content of care received by mothers and newborns is therefore often of poor quality and the discordance between increased utilisation of care without the expected corresponding gains in survival is referred to as the *quality gap*. Closing this quality gap demands an understanding of its underlying determinants, approaches to measure its characteristics and effective improvement strategies.

AIM: To assess implementation bottlenecks in district health systems, and evaluate strategies to address these, in order to contribute to closing the quality gap in maternal and newborn care in Sub Saharan Africa

METHODS: **Study I** was a multiple case study comparing attributes related to use of Clinical Practice Guidelines (CPGs) for maternal health in Burkina Faso, Ghana and Tanzania, focusing on their content and format, using document review and key informant interviews. **Study II** was a cross-sectional study where household and health facility data was linked to estimate effective coverage, the extent to which interventions were implemented as intended, of five key maternal and newborn health interventions, and to identify bottlenecks in their implementation in rural Tanzania. **Study III** was a qualitative study using a grounded theory approach to analyse 17 health worker interviews, examining the underlying conditions for care provision and health workers' perceptions of what constitutes quality of care (QoC). **Study IV** was a qualitative process evaluation of a collaborative quality improvement (QI) intervention in rural Tanzanian health facilities. Health workers' perceptions of the components of the intervention was analysed through a deductive theory driven approach, utilising the i-PARIHS framework as a lens, to elucidate contributors to mechanisms of effect.

RESULTS: While the content of national CPGs correlated well with WHO guidelines, deficiencies in their format in terms of usability and applicability may limit implementation by health workers in practice (**Study I**). Effective coverage of maternal and newborn health interventions varied between 3% and 49% in the target populations despite high utilisation of health services; the implementation bottlenecks being similar within, but different between, districts (**Study II**). Unpredictability was identified as the fundamental condition for maternal and newborn care provision and an important determinant of quality (**Study III**). The components of collaborative QI interpreted as contributing to mechanisms of effect were: (1) improvement topics with a high degree of fit with existing practice; (2) run-charts using local data to monitor progress; (3) mentoring and coaching in individual health facilities. (**Study IV**).

CONCLUSIONS: Improving the format of CPGs for maternal and newborn care could increase their usability and applicability, and therefore implementation, by health workers in practice (**Study I**). Estimating effective coverage in conditional stages along an implementation pathway can help to identify bottlenecks within health systems. Differences between districts reveal the utility of analysing bottlenecks at this level (**Study II**). Increasing predictability of health facility readiness, and focusing on the experiences of health workers, should be prioritised in order to improve QoC (**Study III**). Focusing on intervention components which meet the perceived needs of health workers may enhance mechanisms of effect and result in greater improvements in QoC and could also be used to guide harmonisation between different QI approaches (**Study IV**).

LIST OF SCIENTIFIC PAPERS

- I. **‘How to know what you need to do’: a cross-country comparison of maternal health guidelines in Burkina Faso, Ghana and Tanzania**
Baker U, Tomson G, Somé M, Kouyaté B, Williams J, Mpembeni R, Massawe S, Blank A, Gustafsson LL, Eriksen J
Implementation Science 2012; 7: 31
- II. **Identifying implementation bottlenecks for maternal and newborn health interventions in rural districts of the United Republic of Tanzania**
Baker U, Peterson S, Marchant T, Mbaruku G, Temu S, Manzi F, Hanson C
Bulletin of the World Health Organization 2015; 93:380-389
- III. **Unpredictability dictates quality of maternal and newborn care provision in rural Tanzania: a qualitative study of health workers’ perspectives**
Baker U, Hassan F, Hanson C, Manzi F, Marchant T, Peterson S, Hylander I
BMC Pregnancy and Childbirth 2017; 17:55
- IV. **‘They don’t abandon us these people’ A qualitative process evaluation of collaborative quality improvement for maternal and newborn care in rural Tanzanian health facilities: Exploring components contributing to mechanisms of effect using the integrated ‘Promoting Action on Research Implementation in Health Services’ (i-PARIHS) framework**
Baker U, Petro A, Marchant T, Peterson S, Manzi F, Bergström A, Hanson C
Manuscript

The publications and manuscript will be referred to in the text as Study I-IV.

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ABBREVIATIONS

❖ ANC	Antenatal care
❖ CDSS	Clinical Decision Support System
❖ CPG	Clinical Practice Guideline
❖ HMIS	Health Management Information System
❖ i-PARIHS	Integrated Promoting Action on Research Implementation in Health Services framework
❖ MMR	Maternal Mortality Ratio. The number of maternal deaths during a given time period per 100,000 live births during the same time-period.
❖ MNC	Maternal and Newborn Care
❖ NMR	Newborn Mortality Rate. The number of babies that die in the first 28 days of life, per 1,000 live births, in one year.
❖ QI	Quality Improvement
❖ QIT	Quality Improvement Team
❖ QoC	Quality of Care
❖ SBA	Skilled Birth Attendant
❖ SSA	Sub Saharan Africa
❖ WHO	World Health Organization

OPERATIONAL DEFINITIONS

❖ Access to care	A person's ability to utilise the care they need. Can be described in terms of physical, financial and cultural access.
❖ Applicability	The degree to which a clinical practice guideline can be applied for the management of individual patients in a given context.
❖ Bottleneck	A component within a system which limits the overall capacity or performance of that system.
❖ Childbirth	Synonymous with <i>labour and delivery</i> .
❖ Clinical Practice	The process of providing care: history taking, examination, investigation, diagnosing, managing and treating a patient or client.
❖ Coverage	The proportion of a population which receives a health intervention.
❖ Context	Synonymous with <i>environment</i> or <i>setting</i> ; can be described in terms of its resources, structure, systems and culture.
❖ Degree of fit	Whether, for example, a clinical guideline is <i>compatible</i> with established routines and ways of working
❖ Determinant	A factor which affects a health outcome, or an outcome such as access to care, health facility readiness or clinical practice.
❖ Effective coverage	The proportion of a target population which receives a health intervention of sufficient quality to have an impact on the targeted health outcome.

❖ Facilitation	A process of helping or ‘making something easier’. Enabling others to do something.
❖ Health facility	A physical structure where health services are offered. In the Tanzanian setting: hospitals, health centres and dispensaries.
❖ Health facility readiness	The capacity of a health facility to provide care: its amenities, human resources, medicines, equipment and diagnostic facilities.
❖ Health system	The organisations, people and actions whose primary intent is to promote, restore or maintain health.
❖ Health workers	Professionals trained to provide health care, such as doctors, clinical officers, nurses, midwives and medical attendants.
❖ Implementation	The act of carrying an intention, for example a policy or a guideline, into effect.
❖ Intervention	A purposeful action or actions to achieve a change.
❖ Maternal death	The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.
❖ Mechanism of effect	The processes that will lead to changes as a result of an intervention.
❖ Newborn death	The death of a baby within the first 28 days of life
❖ Quality gap	A discrepancy between utilisation of a health services and the expected health outcomes as a result of that utilisation, indicating poor quality of care.
❖ Quality of care	The extent to which health care services provided to individuals and patient populations improve desired health outcomes.
❖ Unpredictability	A lack of knowledge of future circumstances; whether and when a situation will change and what its characteristics may be.
❖ Usability	Synonymous with <i>user-friendliness</i> : how easy it is to use a clinical guideline in everyday practice.
❖ Utilisation of care	Synonymous with <i>uptake of care</i> and <i>contact with care</i> , for example ANC attendance and childbirth in a health facility.

1 PREFACE

My first personal encounter with the tragedy of a newborn death was during my placement as a volunteer with UNICEF in Asmara in Eritrea in 1995. A colleague in the office had gone through a normal pregnancy, but something happened during childbirth, and her baby died. I was young and didn't understand all the details but have strong memories of the devastation of this woman and everyone around her.

Later, I became pregnant with my first daughter while working as a doctor together with my husband, Tim, in rural Tanzania. In between our house and the hospital lay the maternity waiting home which we walked past every day to and from work. Being close to the hospital was not always a guarantee that things would go well though. One mother developed symptoms which she did not recognise as dangerous and, despite staying right next to the hospital, neither she nor her baby survived. We left Tanzania 4 months before Alva was born. I developed pre-eclampsia resulting in an induced delivery, severe post-partum bleeding and the need for emergency surgery. Even in Sweden, one of the safest countries in the world to give birth, management of this situation was challenging. It was possible that neither I nor Alva would have survived had we remained in Tanzania. I experienced, physically and emotionally, the deep unfairness that we were given all the support we needed, while our fellow mothers and newborns in many parts of the world were not.

My interest for global health originated early from this social justice perspective, from anger about the unfairness of the widely disparate conditions under which humans live and die. I wanted to be part of a process of positive change, a process that would change the system. While working in Tanzania in 2005, at the time when the antiretroviral drugs for HIV finally became available, I witnessed first-hand the successes of a well-resourced program focusing on a single disease. But I also saw some of the negative consequences for the system around it. This strengthened my conviction that focusing on single diseases alone will not lead to lasting improvements of health care in low resourced settings, and it became another reason why I wanted to study maternal and newborn health. There is no one simple answer. Saving the lives of mothers and newborns requires the whole system to function well. I hope that my thesis will shed some light on the challenges to achieve this, and also the opportunities and possible solutions ahead.



2 BACKGROUND

2.1 BURDEN OF MATERNAL AND NEWBORN DEATHS

Every year, 200,000 maternal deaths, 1 million newborn deaths and 1 million stillbirths occur in Sub Saharan Africa (SSA) [1-4]. The life-time risk for a 15 year old girl of dying a maternal death in SSA is nearly one hundred times that of the risk in high-income countries [1, 5]. The risk of dying for newborns, in the first 28 days of life, also remains high despite overall gains in child survival [4].

Despite the magnitude of this mortality burden, substantial gains in survival have been made since 1990 [6]. Millennium Development Goals (MDG) 4 and 5 marked a concerted global commitment to improve maternal and newborn health with the aim to reduce child mortality by two thirds and maternal mortality by 75% by 2015 [5, 7].

In SSA, the Maternal Mortality Ratio (MMR), the number of deaths per 100,000 live births, decreased by 45% between 1990 and 2015 [5]. The median MMR for the region in 2015 was 546 but with great variation: the MMR of 1360 in Sierra Leone being 10 times that of the MMR of 129 in Botswana [1, 5]. Rwanda was the only country in SSA to reach MDG 5 with a reduction in MMR of just over 75 % [5]. Tanzania, the country of focus for this thesis, reduced its MMR by 60%, from an MMR of 997 in 1990 to 398 in 2015 [5]. With 8200 maternal deaths in 2015, it was one of the ten countries that together accounted for 59 % of all maternal deaths globally [5].

For children under 5 years, mortality in SSA reduced substantially with a mean mortality reduction of 54 % between 1990 and 2015 [7]. Ten countries in the region, including Tanzania, met the MDG 4 of a reduction of under-five mortality by two thirds [7]. Newborn survival did not improve at the same pace however; the mean mortality reduction for the region was only 38% between 1990 and 2015 [7].

2.2 WHY DO MOTHERS AND NEWBORNS DIE?

2.2.1 Medical causes

The majority of maternal and newborn deaths occur during a critical forty-eight hour window around labour, delivery, postpartum and the first day of the postnatal period [8, 9]. In SSA, the leading direct causes of maternal deaths are haemorrhage (24%), hypertension (16%), sepsis (10%) and abortion (10%) [10]. Other direct causes account for 9% of deaths and include complications arising during delivery such as obstructed labour. Indirect causes, including HIV/AIDS and other pre-existing medical conditions such as diabetes and cardiac disease, account for the remaining one third of deaths [10].

The three leading causes of newborn deaths in Sub Saharan Africa are: preterm births (30%), intrapartum related complications (29%) and sepsis/meningitis (18%) [4].

Approximately 50% of stillbirths occur during labour and delivery due to obstetric complications [11].

2.2.2 Social determinants

Underlying the medical causes of maternal and newborn deaths is a complex web of social determinants, contributing to or protecting from mortality in different ways. The World Health Organization (WHO) has defined these determinants as *“the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life”* [12]. These conditions are factors such as poverty, education, social and gender norms, cultural practices and legal rights. While some determinants result in worse outcomes for mothers and newborns directly, through causing poor health status and therefore an increased risk of dying from complications; many contribute to mortality through limiting access to care. This access can be characterised in terms of availability (physical access), affordability (financial access) and acceptability (cultural access) [13]. The level of access in turn determines utilisation of care, the starting point for delivery of key interventions around the time of childbirth when the majority of deaths occur. While these determinants are not within the scope of the work of this thesis, a brief summary is outlined below.

Poverty is a well-known determinant of poor maternal and newborn health outcomes [14, 15]. It affects all aspects of access adversely and may be associated with poor nutritional status increasing the vulnerability for complications, for example in the case of anaemia. Poverty is often inversely associated with level of education, another determinant of health care utilisation during pregnancy, delivery and postpartum period [14, 16-18]. This has been illustrated not only by the association between low level of education and severe maternal events but also, that a high level of education is associated with a greater proportion of mothers receiving appropriate care [19]. Harmful cultural practices, such as female genital cutting and unhygienic umbilical cord care, have also been shown to be more prevalent in women of lower education status [20].

Societal and gender norms which affect women’s status and decision making power also influence access to care. Improving gender equity has been put forward as a vital driver for improving maternal health [21]. Where women’s decision-making power within the household is low, utilisation of care may be affected negatively, not only for poor women but also for those in wealthier households [22]. One study showed that women married as minors benefitted less from the positive effects of an intervention which improved utilisation of care [23].

Fundamentally, the negative effects of social determinants could be attenuated if the rights to reproductive and maternal were health fulfilled. In 2009, United Nations Human Rights Council recognised avoidable maternal deaths as a human rights violation [24]. While this recognition bears significance, especially in holding nations accountable [25], declarations alone do not easily translate to rights on the ground. One example is the restrictive laws of abortion services, severely undermining these rights and resulting in a large number of

maternal deaths globally [26]. Another key issue is the challenge for underfunded health systems to fulfil these rights through the implementation of effective care around the time of childbirth [27].

2.3 EFFECTIVE MEDICAL INTERVENTIONS

Where there is adequate access to and utilisation of care, the majority of maternal and newborn deaths and still births could be averted by effective medical interventions delivered during pregnancy, childbirth and in the immediate postpartum period [28].

2.3.1.1 Antenatal Care

Antenatal care (ANC) is the care provided to a woman during her pregnancy. WHO states its main purpose as “enabling risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion” [29] It provides an important platform for the delivery of health promoting, preventive and curative services [30]. Screening and appropriate management of several conditions that, if left undetected could affect the health of mother, foetus and newborn adversely, are a core components of ANC and should include: pre-eclampsia, gestational diabetes, anaemia and infections such as syphilis, HIV, Hepatitis B and rubella [31]. In malaria-endemic areas, distribution or subsidies for insecticide treated nets, administration of “Intermittent Presumptive Therapy as prevention” and/or active case management of malaria is recommended [30]. Counselling mothers on birth preparedness is another essential component.

2.3.1.2 Routine Childbirth Care

The core of routine childbirth care is regular assessment of the progress of labour and the health of mother and foetus [31]. Monitoring should include intermittent auscultation of foetal heartbeat, assessment of the frequency of uterine contractions and vaginal examination to determine the dilatation of the cervix [31]. Administration of Oxytocin, Ergometrine or Misoprostol should be part of the Active Management of the Third stage of Labour (AMTSL) to prevent postpartum haemorrhage [31, 32]. Ensuring hygienic conditions, through the use of soap and water and single-use gloves, is another important aspect of routine childbirth care [31]. Indeed, the importance of Water Sanitation and Hygiene (WASH) for perinatal health outcomes is receiving increasing attention [33].

In a healthy newborn, in the absence of asphyxia, delayed cord clamping has shown to reduce the prevalence of subsequent anaemia [34]. Other interventions benefitting both mother and newborn are immediate skin-to-skin contact and the initiation of breastfeeding in the first hour after birth [31].

2.3.1.3 Emergency Obstetric and Neonatal Care

The condition of mother and newborn can deteriorate quickly during the course of labour and delivery [35]. It is for this reason that the ‘risk approach strategy’, where only those mothers identified as being at high risk were encouraged to deliver in health facilities, has been

supplanted by the promotion of institutional delivery for *all* mothers [36]. If labour is premature, the mother should be given corticosteroids to prevent respiratory distress in the newborn [37]. In cases of prolonged labour, pre-eclampsia or eclampsia, signs of foetal distress or asphyxia in the newborn, immediate measures such as Caesarean section or newborn resuscitation are needed. Emergency Obstetric and Neonatal Care (EmONC) is the term used to describe interventions which need to be available 24 hours a day to be able to respond to such complications [38]. Categorised into basic (BEmONC) and comprehensive (CEmONC); the basic level includes administration of parenteral antibiotics, anticonvulsants and uterotonics, assisted vaginal delivery, manual removal of the placenta or retained products and resuscitation of the newborn [38]. CEmONC includes all of the components of BEmONC plus the ability for Caesarean section and other surgery plus blood transfusions [38].

2.3.1.4 Postpartum and Postnatal Care

The care provided to mothers and newborns immediately after birth and in the following weeks is important. Thermal care of the newborn, through skin-to-skin contact, initiation of breastfeeding within the first hour and hygienic cord care, for example with the application of Chlorhexidine, are all important measures [31, 37, 39].

Where possible, the mother should remain in the health facility with her newborn for 24 hours after a normal vaginal delivery [39, 40]. During this time, monitoring and detection of any complications such as bleeding and signs of infection should be done. At discharge, the mother should be counselled on any danger signs that may develop in herself or her newborn, iron and folic acid supplements should be provided and at this stage or at subsequent visits, methods of family planning should be offered [31].

2.4 REMAINING CHALLENGES – THE QUALITY GAP

In light of the existence of these effective interventions that could significantly reduce the continued high maternal and newborn mortality in many parts of SSA, what are the key challenges ahead? Where should the focus be as we move from the MDGs to the Sustainable Development Goals (SDGs) which aim to reduce the global MMR to 70 per 100,000 live births and the Newborn Mortality Rate (NMR) to no more than 12 per 1000 by 2030 [41]?

The encouraging increase in utilisation of care, reflected in greater coverage of ANC and health facility deliveries, has in many settings not translated into the expected corresponding gains in survival [42-46]. This discrepancy has given rise to the concept of a *quality gap* in maternal and newborn care (MNC); implying that the content of care provided in health facilities is often of insufficient quality to have a major impact on mortality and morbidity, and that more avoidable deaths than before now occur in health facilities [31, 44, 47]. Closing this quality gap could prevent the deaths of an estimated 100,000 mothers, 500,000 still births and 1 million newborns world-wide by the year 2020 [28]. Along with reaching those mothers and newborns not yet reached by maternal and newborn health services and reducing inequity [15], improving the quality of care for those who *do* access and utilise these services is therefore crucial [28, 31, 44].

Ultimately, this quest relies on appropriately supported, skilled health workers providing evidence-based, safe and respectful care [48-50]. Tracking the proportion of mothers who go through childbirth in the presence of a Skilled Birth Attendant (SBA) has indeed been one of the key indicators for MDG 5 [51]. The importance of a SBA present at the time of birth rests on historical evidence such as the decline in mortality associated with the introduction of midwives in Sweden [36, 52]. One conclusion from a comparative study of maternal mortality between 1880 and 1950 by Loudon was that “*where a high standard of care, free of charge or at minimum cost, was made available to the poor, childbirth with low mortality was usually the result, regardless of social and economic conditions*” [53]. In more recent years, the significance of SBAs has been reinforced by the disappointing impact on mortality of other interventions such as the deployment of Traditional Birth Attendants and the ‘risk approach strategy’ in ANC [54, 55].

While the underlying assumption is that the presence of a SBA will increase delivery of life-saving interventions for mother and newborn at the most critical time [36, 50, 56]; the quality gap emphasises that mere SBA presence is not enough. Many low-income countries have initiated and maintained focus on SBAs, whereas the content and quality of care provided have lagged behind [57].

2.5 DEFINING QUALITY OF CARE

Recognising the urgent need to address this quality gap in maternal and newborn care, WHO recently presented its vision and framework for quality of care (QoC) for pregnant women and their newborns, where QoC is defined as *‘The extent to which health care services provided to individuals and patient populations improve desired health outcomes. In order to achieve this, health care needs to be safe, effective, timely, efficient, equitable, and people-centred [45]’*. The WHO definition recognises the complex interaction between the provision of care and the experience of that care [58]. The same definition has previously been outlined by the Institute of Medicine and the dimensions overlap with those of Donabedian [59, 60]. A shorter definition of QoC has been suggested as care that is *“effective, safe and a good experience for the patient”* [61].

Inherent in these dimensions of QoC are the different perspectives from which it can be viewed and assessed. One distinction can be made between the technical components of care and the way that interpersonal skills and communication is used to deliver those components [62]. These two perspectives are, however, fundamentally linked. Effective care, for example, can be defined as care which is delivered according to evidence-based standards and results in improved health outcomes [63]. Based on such a definition, it would be easy to conclude that effective care is solely about the technical component. However, without the involvement of patients, their understanding and adherence to the advice or medication given, effective care can rarely be achieved. In maternal and newborn care, recent evidence suggests that focusing merely on increasing coverage, the proportion of a target population who received a medical intervention, is not enough to achieve reductions in mortality [64]. Linked to this is the increasing awareness of the importance of and deficiencies in respectful provision of maternal care in SSA [65]. It is clear that all dimensions of quality are needed to achieve desired health outcomes, both at the individual and at the population level.

Another way to conceptualise quality, initially outlined for its assessment, is that suggested by Donabedian through measuring aspects of the *structure, process* and *outcomes* of care [60]. Structure refers to what is needed to provide care such as drugs, equipment and human resources. Process refers to clinical practice and other activities that constitute health care, and outcomes are what is achieved in terms of the care delivered and health status. The recently published WHO QoC framework for MNC incorporates these components and the two perspectives of quality from a provider/technical perspective and the experience of care.

The WHO framework describes eight domains of QoC for MNC: (1) Evidence based practices for routine care and management of complications; (2) Actionable information systems; (3) Functional referral systems; (4) Effective communication; (5) Respect and preservation of dignity; (6) Emotional support; (7) Competent, motivated human resources; and (8) Essential physical resources available [58]. Interestingly, the WHO framework conceptualises all of these domains as being part of the process of care whereas domains 2, 3, 7 and 8 would more commonly be considered as the structure needed to provide care. For each domain of quality, corresponding standards have been formulated. Standards are defined

as “*descriptions of what is expected to be provided to achieve high-quality care*” [58]. For each standard of care, there are two to three quality statements; with the exception of *Standard 1 – Evidence based practices for routine care and management of complications during labour, childbirth and early postnatal period, according to WHO guidelines*, for which there are 13 specific quality statements, reflecting the significance and complexity of this standard and mirroring the range of effective interventions available to prevent or treat complications in the mother or newborn [58].

2.6 HEALTH SYSTEMS AND DECENTRALISATION

Ensuring provision of quality health care is complex for any health system [66]. Where resources are scarce, the provision of appropriate and timely care during and around child birth is especially challenging as this requires skilled health workers in functioning facilities with drugs and equipment available 24 hours a day [27, 38, 45].

A health system has been defined as “*all organisations, people and actions whose primary intent is to promote, restore or maintain health*” [67]. The health system is often conceptualised as comprising six building blocks: governance, financing, information, medicines and technology, human resources and health service delivery [68]. The interdependency of these can be illustrated in various ways; in this thesis, the first five building blocks are seen as supporting effective health service delivery, be it promotive, preventive, curative or palliative (Fig 1). The role of people, not just as beneficiaries, but as drivers of the system [68], is depicted as central to all the building blocks.

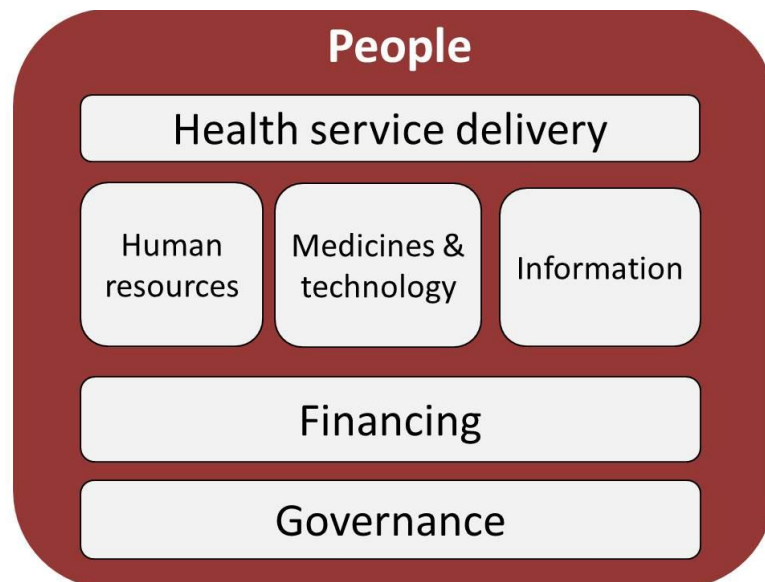


Figure 1: Health system building blocks

In many countries in SSA, including in Tanzania, all or part of the responsibility to implement MNC, as well as other primary health care services, has been decentralised to the district level of the health system. In practice this means that some of the functions and responsibilities of a national health system, such as planning, technical support and budget preparations, are moved to the district level [69].

2.6.1 Governance, financing, information, medicines and technology

Governance for maternal and newborn health involves formulating policies and strategic plans and putting structures in place to implement those plans. It also involves ensuring accountability at different levels of the system, for example through transparent and regular reporting of data [70]. Defined as “*a set of processes (customs, policies or laws) that are formally or informally applied to distribute responsibility or accountability among actors of a given [health] system*”, good governance at all levels is a necessary function to improve QoC for mothers and newborns [68, 70, 71]. While policies and strategic plans are often formulated at the national level with international support, in Tanzania, operationalisation and implementation is generally the responsibility of the district level which can result in tensions [72].

Financing of MNC is essential to ensure the delivery of quality health services and to enable implementation of national policies. One of the challenges faced by districts in Tanzania is the delays in disbursement of funds from central government to implement policy [73]. Countries in SSA are largely dependent on external funding to support their maternal and newborn health policies [74]. But while external financing for global health issues has increased overall, that for maternal and newborn health has proportionally increased much less than that for HIV/AIDS, malaria and TB [75]. One reason for this is that effective MNC depends on the functionality of the entire health system, contrary to other vertical programs [76]. A review of financing for maternal and newborn health in 2010 concluded that available resources and external financing was severely inadequate to reach the MDGs [77].

Access to reliable and timely data from routine Health Management Information Systems (HMIS) and vital registers of births and deaths is the key to identify areas for improvement and to evaluate effectiveness of such efforts. At the district level, data is rarely available from population based surveys hence priority setting is largely dependent on regional data from *Demographic and Health Surveys* (DHS), from *Service Provision Assessment* (SPA) surveys [78], which do not reflect the particular situation in an individual district.

Ensuring availability of essential drugs and equipment is another challenge in under-resourced health systems [79]. While Tanzanian districts for example are accountable for the provision of maternal and newborn care, they depend on the national Medical Stores Department (MSD) to supply the drugs needed to do so [80]. Moreover, the districts’ budget for drugs and equipment is linked to MSD which limits their possibilities to source drugs elsewhere if MSD is out of stock [81].

2.6.2 Human resources and health service delivery

Health workers form the core of health systems. Without them, no health services can be delivered [82]. Cadres range from doctors, midwives, nurses and auxiliaries, to Community Health Workers. In most Sub Saharan African countries, the availability of health workers is far from satisfying the needs of the populations and the absolute lack in numbers is further aggravated by maldistribution within countries [83, 84]. In rural settings, a nurse or midwife will almost always be available in the district hospital and at health centres, but not necessarily in the lower level health facilities such as dispensaries. The result is that mothers, who in many areas have been actively encouraged to deliver in a health facility, are attended by auxiliary staff such as medical attendants, who do not always have the necessary skills to provide safe routine childbirth care. Together with the challenges of ensuring reliable transport in the case of complications, this situation has been used as an argument to centralise childbirth care [85].

Strategies to improve the availability of skilled staff in rural areas have been an integral part of health systems in SSA for a long time. Non-physician clinicians such as Assistant Medical Officers and Clinical Officers form the backbone of health services in countries such as Tanzania and Malawi [86, 87]. Notwithstanding these strategies, the number of health workers does not suffice and in reality, “unofficial” task sharing is taking place, resulting in situations where auxiliary staff is faced with clinical situations beyond their capacity and level of training. As a result of these challenges, ensuring motivation and retention of health workers in rural areas is an on-going battle [88].

Against this background of insufficient funding, lack of locally relevant information, poor supply of drugs and equipment and a lack of colleagues, it is not surprising that delivery of quality health services is a challenge. Indeed, health worker performance in this context has repeatedly been found to be poor [89].

2.7 MEASURING COVERAGE AND QUALITY

One of the measures used to assess the performance of health systems is coverage. Coverage describes the proportion of a population which is reached by a health intervention and is a measure used to track progress and to guide priority setting. It can be measured at different levels of the health system: for example for women coming to a particular health facility or for the entire population of a district, region or country.

Progress towards MDGs 4 and 5 in SSA was tracked using coverage measures for several indicators; the majority of which relied on information from DHS, SPA and Multiple Indicator Cluster Surveys (MICS) [78]. For MNC, the majority of indicators reflected contact with health services: ANC attendance, delivery in the presence of a SBA, postpartum and postnatal checks [90]. These indicators can be measured reliably through household surveys and allow for cross-country comparisons [91]. While they provide important information about mothers' and newborns' utilisation of health services, and indirectly therefore about whether these services are accessible and acceptable, they do not provide insight into the content and quality of care received [92]. Developing indicators that reflect QoC, that can be used to estimate *effective coverage*, is therefore imperative [92, 93]. While the definition of effective coverage varies, it generally refers to a composite measure taking into account health service utilisation, the readiness of that service and in the final stage, the delivery of good quality care [94].

Identifying valid, reliable indicators of QoC for mothers and newborns is however a challenge. A few of these are available through routine surveys but most remain to be developed, especially for the care processes taking place during and immediately around the time of birth [92]. Mothers' recollection of the care they have received for themselves and their newborn during and immediately after childbirth has been shown to have some weaknesses, therefore compromising the validity of such accounts [95, 96]. Direct observations of care provision, for example by using check-lists, can provide important insights but are resource intense. They are also open to the Hawthorne effect where health workers alter the way they provide care due to being observed [97].

In the light of these challenges, the potential of linking data from household surveys with that from health facility assessments have been suggested as a way forward to develop quality indicators and estimating effective coverage in maternal and newborn care [98]. This approach has also been used in assessments of "systems effectiveness" in malaria care [99-101].

2.8 IDENTIFYING BOTTLENECKS

Coverage measures for health interventions can also be used to identify *bottlenecks* in their implementation. A bottleneck can be defined as “that component of a system which limits the overall capacity or performance of that system” (Fig 2) [102]. In systems theory, efforts spent strengthening or improving a system without targeting its bottlenecks will have little or no effect [102]. It would therefore make sense to identify and target bottlenecks within a system, to optimise improvements within a given area of care. This has also been suggested as a priority area in maternal and newborn health [103].



Figure 2: Bottleneck illustration. Pregnant mothers inside the bottle are all in need of the same health intervention but the bottleneck limits those who receive it.

In a seminal paper from 1978, Tanahashi presented an approach to measuring coverage of health services and to identify bottlenecks in their implementation [104]. He proposed five conditional stages of coverage: availability, accessibility, acceptability, contact and effective coverage; where effective coverage represented quality of care. The first three stages represented the health system’s capacity to provide care, and the last two the health system’s output. These stages of coverage referred to the same denominator or target population, and bottlenecks were identified as any significant drop in coverage between them.

The Tanahashi approach has since been adapted and used by researchers and organisations such as UNICEF and the World Bank in their tool on *Marginal Budgeting for Bottlenecks* [105]. At the district level, UNICEF has used a modified Tanahashi approach to measure coverage of the *availability of essential commodities, trained human resources, physical accessibility of service delivery points, initial and continuous utilisation and effective coverage* [106]. As in the original Tanahashi model, the first

three coverage measures reflect the health system’s capacity, whereas the last three reflect its output. Contrary to the Tanahashi model, these coverage measures do not reflect the same denominator [106]. At the national level, large multi-country consultations have been conducted to identify bottlenecks within each health system building block, using the *Maternal and newborn bottleneck analysis tool* [107, 108]. The bottleneck analogy in these cases has been used synonymously with *barrier* or *determinant* of effective coverage of key health interventions [108].

2.9 QUALITY IMPROVEMENT STRATEGIES

Identifying and targeting bottlenecks, through for example root cause analysis, may not always be an explicit aim of *quality improvement* (QI), but is fundamental to improving processes and outcomes of health care. There are a wide range of approaches and strategies used to improve quality of care; from traditional clinic-based audits to those originating from industrial sectors such as the *5S* approach and *Kaizen/Lean* [109-111]. Many strategies focus on enhancing health worker performance and improving clinical practice, for example *Pay for performance* schemes, *Standards-based management and recognition* and *Clinical Decision Support Systems (CDSS)* [112-114]. QI initiatives have also moved beyond health facilities; recognising the powerful role of the community in generating demand for quality health care [42, 115].

While the approaches and tools of QI differ, their aim to improve QoC remains the same and the engagement of front-line health workers, often as both recipients and implementers of program activities, is essential [48]. The nature of QI strategies range from single-component interventions such as targeted training courses [116], through multi-stage interventions in health facilities such as mortality reviews [117], to complex multi-faceted interventions such as collaborative QI using Plan-Do-Study-Act (PDSA) cycles involving community as well as health facility levels [118].

In this thesis two commonly applied QI strategies implemented in maternal and newborn care in SSA are investigated: Clinical Practice Guidelines (CPGs) [119] and collaborative QI based on the Institute for Healthcare Improvement's (IHI) *Breakthrough series* [120]. The characteristics of these two strategies are outlined below, with a summary of the experiences of their use in maternal and newborn care in SSA.

2.9.1 Clinical Practice Guidelines

CPGs can be seen as the starting point, a “proposal for change”, and a tool for improving quality of care [66]. They have been defined as ‘*systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances*’ [121]. CPGs summarise evidence and provide recommendations for clinical practice and as such contribute to setting standards and defining quality of care [66]. There are two main categories of CPGs: those that are developed as tools for clinical decision-making and those that are used to set standards in order to measure QoC [66]. This thesis is concerned with CPGs that fall into the first category.

CPGs to guide clinical decision-making have been an important tool for QI, including for maternal and newborn care, for nearly three decades [121]. In addition to outlining care that is evidence based, they may have benefits in terms of reducing variation in health services delivered, if implemented in practice [119].

CPGs as a discrete intervention, passively disseminated without training and follow-up, however showed small beneficial effects in a Cochrane review from 2012 [122]. In SSA, guidelines are more commonly part of multi-faceted interventions which include strategies to implement them. Determinants of their implementation can be identified at the system level, facility level or at the level of individual health workers [123]. Challenges to CPG implementation include a lack of resources, lack of accountability mechanisms to follow up clinical practice, health workers' attitudes towards changing practice and poor motivation [124, 125].

2.9.2 Collaborative Quality Improvement

Collaborative QI is a complex strategy which has been widely used to improve QoC [126]. It belongs to a group of QI strategies aiming to identify and eliminate barriers for care processes within the system rather than at the individual health worker level. Seven key elements have been outlined as the core of this approach: topic selection, theory, multiple sites, the model for improvement, focus, tension for change and spread [120]. A *topic* should be chosen based on a demonstrable gap in practice, whether there is a standard to strive for and whether the gap is amenable to change. A *theory*, including an aim, “high-leverage” changes and indicators to reflect these, should be developed by a planning group of professionals with experience of QI. Implemented by quality improvement teams (QIT) in *multiple sites*, usually between 25 and 40, the collaborative theory guides QI work which is applied using the *model for improvement* [102]. This model poses three fundamental questions: (1) What are we trying to accomplish?; (2) How will we know that a change is an improvement?; (3) What changes can we make that will result in improvement? These questions are used together with *Plan-Do-Study-Act* (PDSA) cycles to guide small scale testing of change ideas and to monitor progress using the indicators outlined in the collaborative theory [102].

Indicators chosen to monitor improvements are usually displayed on run-charts; diagrams where indicators are plotted and changes over time are easily visible (Figure 3). Successful changes are hypothesised to be able to be rapidly scaled up to other health facilities within the collaborative, where ideas and experiences are shared during collective learning sessions, contributing to the *spread* of successful strategies. *Focus* refers to distilling the information relevant to QITs in a way that is easily digestible. Finally, the creation of a *tension for change* is a critical element, generated by shared time-lines between QITs, self-assessments and positive peer pressure [120].

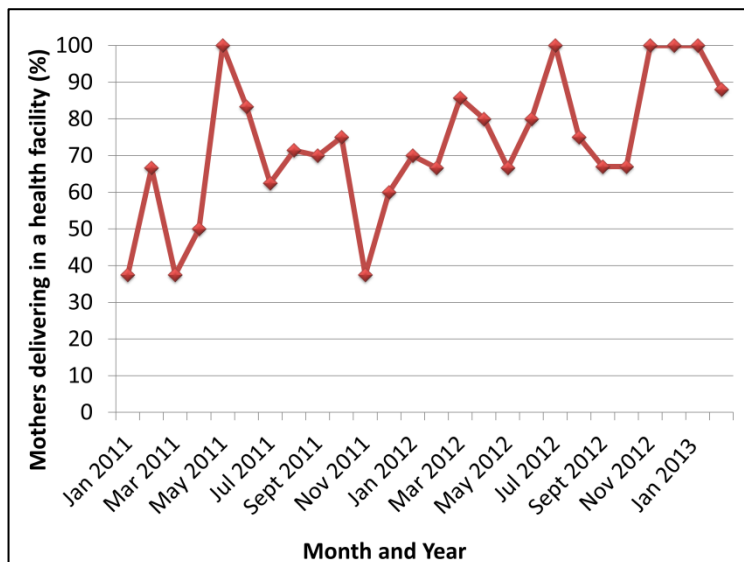


Figure 3: Example of a run-chart.

The proportion of mothers in a dispensary's catchment area that deliver in the health facility each month.

While emphasis and approach differ between collaboratives, many have been modelled on the IHI's Breakthrough series [120, 127]. This was also the case for those included in a review of the effectiveness of 27 QI collaboratives implemented between 1998 and 2008 in 12 low- and middle income countries, five of which were in SSA [127]. The evaluation was based on analysis of run-charts generated by the QITs themselves. Results were positive and showed significant improvements which were sustained over time, especially for those collaboratives where baseline levels of quality were low [127]. While these findings were encouraging, it is worth considering the potential sources of bias in the self-generated data, as well as the fact that there were no control facilities. One of the largest national collaborative QI interventions in SSA in recent years was conducted in Ghana through the 'Project Fives Alive!' between 2008 and 2015 [128]. This project targeted both maternal and child health and the impact evaluation of 744 health facilities showed positive results with increases in skilled delivery, early ANC attendance and reduced child mortality [118].

QI collaboratives to improve maternal and newborn care have also engaged QITs in the community as well as at facility levels. In Kenya, a district QI collaborative consisted of health workers and community members where the focus was mainly to improve utilisation of care which was also achieved; a result to be interpreted with caution as, again, self-generated data was used and there was no control group [129]. In Malawi, the MaiKhanda trial also engaged health facilities and community groups to improve maternal, neonatal and perinatal health outcomes, where the health facility component was based on IHI's Breakthrough series [130]. The impact evaluation utilised a cluster randomised controlled design and showed a reduction in neonatal mortality of 22% for the combined approach of health facility QI and women's groups, and for the women's group intervention alone, a reduction in perinatal mortality by 16% [130].

2.10 THE SCIENCE OF IMPLEMENTATION

QI strategies can be conceptualised as *implementation strategies* in that they aim to improve the application of existing knowledge, rather than creating new evidence [131, 132]. The science of investigating QI strategies hence falls within the growing field of implementation science. This field has been defined simply as “*the scientific enquiry into questions concerning implementation*” [132] and more elaborately as “*the scientific enquiry into questions concerning implementation—the act of carrying an intention into effect, which in health research can be policies, programmes, or individual practices (collectively called interventions)*” [133].

The focus of implementation research is “*to understand not only what is and isn’t working , but how and why implementation is going right or wrong, and testing approaches to improve it*” [132]. A core area of enquiry is therefore concerned with implementation strategies: the means or ways through which change can be brought into health care practice to adopt and sustain evidence-based interventions [132, 134].

2.10.1 Implementation strategies

Efforts have been made to classify implementation strategies and a list of 73 discrete strategies, envisaged to bring consistency in reporting, was recently published [131]. According to this categorisation, CPGs can be conceptualised as a discrete one-component strategy, described as ‘developing educational materials’. However, in order to implement CPGs in practice, strategies such as ‘distribution of educational materials’ and ‘conducting educational meetings’ would also be needed [131]. Collaborative QI can in turn be conceptualised as a multi-faceted *implementation intervention* consisting of a collection of discrete implementation strategies including ‘conducting cyclical small tests of change’, ‘creating a learning collaborative’ and ‘facilitation’ [131, 135].

As well as categorising implementation strategies according to the ‘action’ involved, they can also be categorised based on the main actor or stake holder involved [132]. Collaborative QI and CPGs would mainly be used at *the implementing and organisational provider* level or on the *individual provider and front-line workers* level. Other levels include *government* and *communities and households* levels where QI using PDSA-cycles has been also been used although it is less common [136, 137].

A third way of categorising implementation strategies is by the underlying theoretical assumptions on which they are based; how the strategy is envisaged to produce the change needed to improve care [66]. These theories of change have originated from diverse fields such as psychology, education research and management sciences and can broadly be aligned to whether they relate to individual professionals, to the social context or the organisational and economic context [138].

For example, the assumptions underpinning the use of CPGs as an implementation strategy would fall within the cognitive theories relating to individual professionals. Cognitive

theories view clinical practice as determined by a rational process where health workers weigh and consider available information to make clinical decisions and act on those decisions. CPGs would therefore influence this process positively by providing evidence-based information that can improve care [66].

The theory underpinning collaborative QI is more complex. The various implementation strategies used under this umbrella would relate to theories of implementing change both in individual professionals, as well as those relating to the social and organisational contexts [66]. Overall, the responsibility of change is placed at the organisational rather than the individual level.

2.10.2 Implementation outcomes

The outcomes of interest in implementation research are indicators of how well an implementation strategy or an implementation intervention is working [132]. These outcomes include: *acceptability*, how the intervention is perceived by its recipients; *adoption*, to what extent the recipients use the intervention; *appropriateness*, whether the intervention is appropriate for the needs of recipients and the context in which they work; *feasibility*, whether the intervention is possible to implement; *fidelity*, how closely the intervention was implemented according to the initial plans and protocol; *implementation cost*; *coverage*, what proportion of recipients or a target population was reached by the intervention; and *sustainability* of the implementation strategies [133]. These characteristics overlap with those of interest for process evaluations which are concerned with how and why an intervention worked, including its implementation and *mechanisms of effect*, how the intervention produced change [139]. Generally, not all implementation outcomes are investigated within the same study; the focus is tailored to what is already known about the implementation strategy and the intervention to be implemented. [132].

2.10.3 Implementation frameworks

Frameworks, models and theories have been developed for the purpose of investigating implementation processes and to describe the outcomes outlined above. These can be divided into those that aid in describing or guiding implementation, those that aim to understand or explain implementation and those that can be used for evaluating implementation interventions [140]. While each framework has its own focus, there is considerable overlap in the constructs believed to be significant. Many of these constructs are represented in the integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework [141].

I-PARIHS is a recent revision and update of one of the most frequently used frameworks in implementation science: the Promoting Action on Research Implementation in Health Services (PARIHS) framework [140-142]. The PARIHS framework early on outlined the multi-dimensional nature of implementation and emphasised the interaction between three core constructs: the characteristics of the *evidence* to be implemented, the *context* where this is done and the mechanisms by which the change is *facilitated* [142]. In i-PARIHS, this

equation has been updated; evidence has given way to the wider term *innovation* and the *recipients* of this innovation has been added as a forth construct [141]. Recipients can be for example health workers or patients. Facilitation is widely defined as a process of enabling, helping or making something easier. It is seen as activating implementation through its interaction with the innovation to be implemented, the recipients of this innovation and the context into which the innovation is introduced [141]. Briefly, successful implementation is more likely where an innovation, for example a clinical guideline or a triage system, is clearly defined, has a high degree of fit but at the same time a comparative advantage to existing practice and where its results are observable [140, 141]. For clinical guidelines, attributes related to *content*, *usability* and *applicability* have shown to be especially important [143]. Usability refers to how easy the guideline is to use in practice; applicability to whether it can be applied to individual patient consultations or whether it is applicable in the context where it is to be used. Recipients of an innovation need to be motivated, have a sufficient level of skills, knowledge and authority to engage with the innovation in a context with supportive leadership and sufficient resources [144]. The method of facilitation, for example supportive supervision or teaching, should ensure a high level of participation of key stake holders, be integrated and iterative and sensitive to the system where it is introduced [144]. While PARIHS was categorised as a determinant's framework, that can be used for planning for implementation, implementation and evaluating the effect of implementation efforts [144], i-PARIHS has taken a further step towards providing a theory of the constructs involved in successful implementation and how these interact [141, 144].

3 THESIS RATIONALE

Closing the quality gap in maternal and newborn health demands approaches to measure its characteristics, an understanding of its underlying determinants and effective improvement strategies.

‘What gets measured gets done’ is a commonly held conviction [6]. It is therefore imperative to develop measures for effective coverage, reflecting the proportion of mothers and newborns who receive interventions of sufficient quality to have an impact on morbidity and mortality. Linked to this is the concept of identifying bottlenecks in implementation; what are the key limiting factors within the health system to achieve effective coverage? The various approaches employed to date have focused on illustrating the constituent components of effective coverage but without linking the utilisation of a health service to the capacity of that service and consequent delivery of care; missing the opportunity to establish and enable a step-wise analysis of an implementation pathway. Furthermore, the utility of conducting bottleneck analyses at district level, where the responsibility to implement health services lies in many SSA countries, is not known.

Health workers have a central role in closing the quality gap, articulated in the title of a viewpoint by Campbell: *“The route to effective coverage is through the health worker, there are no shortcuts”* [48]. A focus on health workers’ experiences, perceptions and needs to provide maternal and newborn care is therefore necessary. While external assessments of QoC, health facility readiness and patients’ satisfaction are important; health workers’ perspectives have been less explored. How do health workers themselves identify good QoC and how do they perceive the conditions for providing such care?

The engagement and involvement of health workers is crucial for successful implementation of the many QI interventions in rural SSA health facilities. Evaluating how the components of such interventions meet the needs of health workers is therefore vital. Are CPGs for maternal care developed in ways which makes them useful for health workers in everyday practice? How do health workers perceive the components of a complex intervention such as collaborative QI [145]? Findings from such evaluations could inform much needed harmonisation between different QI interventions, often implemented concurrently in the same health facilities, and also guide the development of tools such as CPGs to increase their potential to improve QoC.

4 AIM AND OBJECTIVES

4.1 AIM

To assess implementation bottlenecks in district health systems, and evaluate strategies to address these, in order to contribute to closing the quality gap in maternal and newborn care in Sub Saharan Africa

4.2 OBJECTIVES

- (1) To compare attributes related to use of maternal health Clinical Practice Guidelines in Burkina Faso, Ghana and Tanzania, focusing on their content compared to WHO guidelines, format and development processes
- (2) To estimate the effective coverage of key maternal and newborn health interventions and to identify bottlenecks in their implementation in two rural districts in Tanzania
- (3) To examine health worker perspectives of the conditions for maternal and newborn care provision and their perceptions of what constitutes good quality of care in rural Tanzanian health facilities
- (4) To investigate health workers' perceptions of the components of a collaborative quality improvement intervention in rural Tanzanian health facilities, in order to elucidate contributors to mechanisms of effect

5 THESIS FRAMEWORK

The following framework has been developed to illustrate the focus of this thesis within the context of the many determinants of maternal and newborn health as outlined in the background (Fig. 4). It was inspired by and incorporates work of Tanahashi [104], Thaddeaus and Maine [146], Donabedian [60], Adam and Savigny [68] and Tunçalp et al [45]. It outlines three levels of determinants: *health system*, *health service* and *social determinants*, which incorporates socio-economic and socio-cultural determinants. The WHO building blocks of the health system [68] are outlined in white boxes. Health service delivery has been placed in the centre of the framework, its components outlined in more detail. The functions of the other five building blocks are conceptualised as supporting health service delivery; be it promotive, preventive, curative or palliative. Health service delivery, the route to achieving effective coverage of health interventions, is conceptualised as a function of mothers' *utilisation* of health services and the *QoC* they receive [48]. QoC is here described using the simplified version with the three dimensions of being effective, safe and respectful [61]. Mothers' experience of the care they receive is seen as modifying the effect of access on utilisation [45]. QoC is directly determined by the level of *Health Facility Readiness* and the nature of *Clinical Practice*; and indirectly by the other health system building blocks. Utilisation is determined by *access to care* which in turn is determined by the various social determinants; some of which also affect survival independently.

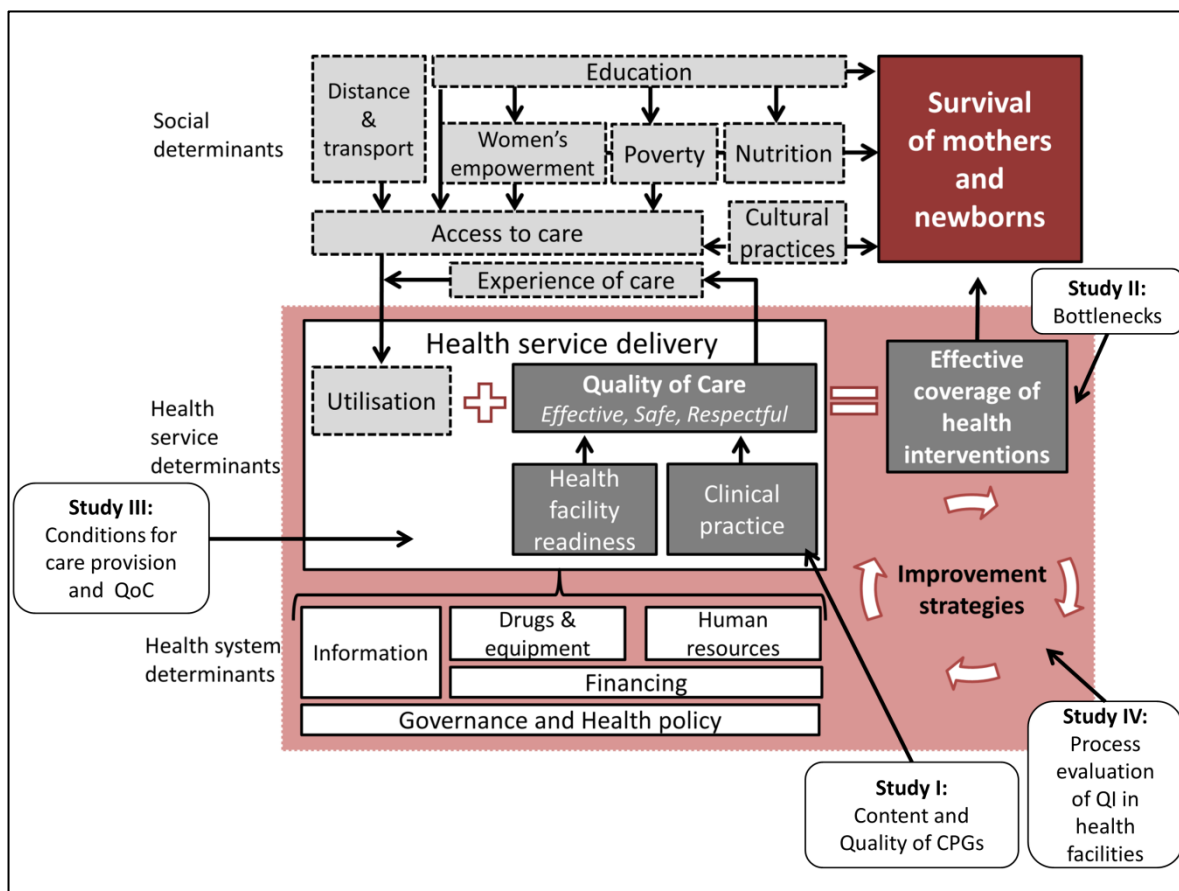


Figure 4: Thesis framework. The focus of the thesis is contained within the pink box. Areas for the individual studies are indicated.

6 MATERIALS AND METHODS

6.1 OVERVIEW

A mixed methods approach was used in this thesis; the overview of which is outlined in table 1. Primary data collection was conducted for Studies I, III and IV while secondary data analysis was employed in Study II.

Table 1: Overview of thesis methods

Study	Design and sample	Setting	Analysis and outcome
I			
'How to know what you need to do': a cross country comparison of maternal health guidelines in Burkina Faso, Ghana and Tanzania	<u>Multiple case study</u> [147] National Clinical Practice Guidelines (n= 7) Key informant interviews (n=28) [148]	Burkina Faso Ghana Tanzania	Document review; qualitative content analysis and cross-country comparison [149]. Assessment of (1) content compared to WHO guidelines and (2) attributes related to their use in practice: usability and applicability. Perceptions of development processes, availability and use.
II			
Identifying implementation bottlenecks for maternal and newborn health interventions in rural districts of the United Republic of Tanzania	<u>Cross sectional study</u> [150] Indicators from the EQUIP surveys [151] : Interviews with mothers (=772); Health facility survey (=60); Interviews with health workers (=68)	Tanzania: Tandahimba and Newala districts	Secondary data analysis linking data from households and health facilities, utilising an updated Tanahashi [104] model. Estimates of conditional stages of coverage to identify bottlenecks in health service delivery.
III			
Unpredictability dictates quality of maternal and newborn care provision in rural Tanzania – A qualitative study of health workers' perspectives	<u>Qualitative study</u> [152] 17 in-depth interviews with health workers	Tanzania: Tandahimba district	Qualitative analysis using a grounded theory approach [152]. Health workers' experiences of the conditions for maternal and newborn care provision and their perceptions of what constitutes good quality of care
IV			
'They don't abandon us these people' A qualitative process evaluation of collaborative quality improvement for maternal and newborn care in rural Tanzanian health facilities	<u>Qualitative process evaluation</u> [139] 16 in-depth interviews with health workers	Tanzania: Tandahimba district	Deductive, theory-driven content analysis [153], using the integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework [141] as a lens. Health workers' perceptions of the components of collaborative QI in health facilities, to elucidate contributors to mechanisms of effect

6.2 STUDY SETTING

The studies within this PhD were conducted in the context of two intervention research projects funded by the EU. These projects were implemented between 2009 and 2014 in four Sub Saharan Africa countries: Burkina Faso and Ghana in West Africa and Tanzania and Uganda in East Africa [154, 155].

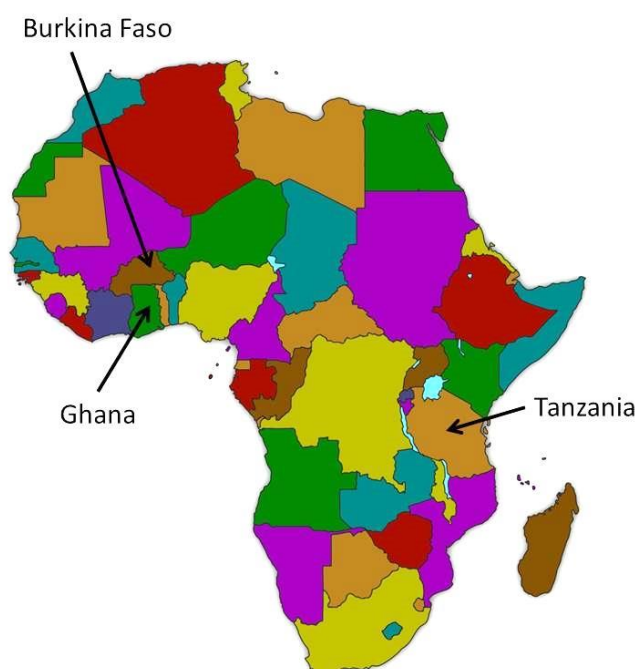


Figure 5: Map of Africa

The three study countries are indicated.

QUALMAT (**Q**uality of **M**aternal and **P**renatal Care: Bridging the Know-do Gap) was implemented in Burkina Faso, Ghana and Tanzania (Fig. 5) in 2009-2013 and aimed to improve quality of care through the introduction of a computer based CDSS. Pre-intervention research for this project provided the setting for Study I; the results of which provided background information for the development and adaptation of the CDSS to the national contexts.

EQUIP (**E**xpanded **Q**uality **M**anagement **U**sing **I**nformation **P**ower) was implemented in 2011-2014 in two rural districts in Uganda and Tanzania; the studies in this PhD, however, only include data from Tanzania. EQUIP was based on IHI's Breakthrough series [155]. It introduced collaborative QI using

PDSA-cycles at community, health facility and district levels with the aim to increase both utilisation and quality of health services for mothers and newborns. Parallel with this intervention, the project implemented continuous household surveys and repeat health facility census surveys in the intervention districts and in the adjacent non-intervention districts [151]. Data from these surveys were used both to inform and monitor the quality improvement as well as to evaluate the impact of EQUIP at the end of the project [155]. Study II utilised data from these surveys and study IV evaluated health workers' perceptions of the components of EQUIP in health facilities. Study III was conducted in the EQUIP intervention district but the objective was independent from the EQUIP study.

6.2.1 Study country characteristics

The three study countries have a high burden of maternal mortality, all with MMR over 300. Tanzania, being the most populous country, has the highest number of maternal deaths, estimated to 8200 in 2015 (Table 2). It has the highest proportion of mothers attending ANC at least once, and the lowest proportion of women with an unmet need for family planning. Newborn mortality is lowest in Tanzania with a mean NMR of 18.8. The total fertility rate varies with the highest of 6.0 seen in Burkina Faso and the lowest of 4.2 in Ghana. Health expenditure as percentage of GDP varies between 4 and 6%, the highest in Tanzania. Total health expenditure per capita is highest in Ghana, followed by Tanzania. The density of health workers vary significantly with Ghana having more than twice the density of Tanzania. This may, however, be due to cadres such as Clinical Officers in Tanzania not being counted in this statistic and it may therefore not be a fair representation.

Table 2: Study Country indicators

Indicator	Year	Data source	Tanzania	Burkina Faso	Ghana
Population size (millions)	2015	[156]	53	18	27
Life expectancy at birth (years)	2015	[156]	65	59	61
Gross National Income(GNI) per capita (current USD)	2014	[157]	920	640	1480
Total health expenditure per capita (Int. dollars, ppp)	2014	[157]	137	82	145
Health expenditure as a percentage of GDP	2014	[157]	6	5	4
Public expenditure as a percentage of total health expenditure	2014	[157]	46	52	60
Density of doctors, nurses and midwives per 10,000 population	2012, 2012 2010	[158]	4.6	6.8	10.6
Total fertility rate (ages 15-49)	2015, 2010, 2014	[159]; [160]; [161]	5.2	6,0	4.2
Maternal mortality ratio (MMR) (80% uncertainty range)	2015	[5]	398 (281-570)	371 (257-509)	319 (216-458)
Number of maternal deaths	2015	[5]	8200	2700	2800
Newborn mortality rate (per 1000)	2015	[162]	18.8	26.7	28.3
Stillbirth rate (per 1000 births)	2015	[3]	22.4	21.2	22.7
Skilled attendant at delivery (%)	2015, 2010, 2014	[159]; [160]; [161]	63.7	65.9	73.7
Delivery in a health facility (%)	2015, 2010, 2014	[159]; [160]; [161]	60.2	66.3	73.1
Antenatal care attendance 1 time (%)	2015, 2010, 2014	[159]; [160]; [161]	98.0	94.9	97.3
Antenatal care attendance 4 times (%)	2015, 2010, 2014	[159]; [160]; [161]	50.7	33.7	87
Unmet need for family planning (%)	2015, 2010, 2014	[159]; [160]; [161]	22.1	23.8	29.9

6.2.2 Tandahimba district

Tandahimba district, the setting for studies II, III and IV, is located in Mtwara region, on the Makonde plateau in rural southern Tanzania, close to the border of Mozambique. Islam is the main religion and the cultural tradition is matrilineal [163]. Tandahimba has a population of about 200,000 people; predominantly subsistence farmers, but there is also cashew nut farming used as a cash crop. The road network within the district becomes muddy during the rainy season, making transport difficult [164].

The district has 32 health facilities which provide maternal and newborn care; all government facilities apart from one health centre which is faith-based. The district hospital provides EmONC as well as regular childbirth care. The three health centres are supposed to manage BEmONC and efforts are underway to upgrade their services to include caesarean sections [164]. In reality however, the functions required to provide BEmONC are rarely fulfilled, especially in terms of assisted delivery and provision of Magnesium sulphate for eclampsia. The 28 dispensaries provide childbirth care according to their abilities including the administration of Oxytocin postpartum when available. Capacity to provide neonatal resuscitation has recently increased in all facilities through provision of equipment and targeted training [165].

There is a severe shortage of health workers with 52% of clinical posts vacant in the district [164]. Lower cadre health workers, such as medical attendants, often have to take on the responsibilities of higher cadre health workers such as nurses and midwives. This unofficial task sharing may for example include to assist women during childbirth [164].

Utilisation of health care during pregnancy is high with nearly all mothers attending ANC at least once during pregnancy, although only half of mothers attend at least four times [159]. The proportion of mothers giving birth in health facilities has increased substantially in recent years and in Mtwara region, it was estimated to 81% in 2015, compared to the national average of 60% the same year [159]. National estimates from 2012 indicated a higher MMR in the Mtwara region (579) compared to the national average (432) [166]. Neonatal mortality in the region was estimated at around 31 per 1000 in 2013 which is also higher than the national estimate of 18.8 in 2015 [159, 167].

6.3 STUDY DESIGNS

Four different study designs were used in this thesis; each chosen based on the study objectives. Study I applied mixed-methods, Study II quantitative methods and Study III and IV applied qualitative methods; the variability in designs reflecting the field of implementation science.

6.3.1 Cross-country comparison of multiple case studies (Study I)

In Study I, the objective was to conduct a cross-country comparison of maternal health guidelines. Cross-country comparisons can yield insights beyond those achieved from single country studies [81, 149, 168, 169]. The choice of a multiple case study design was deemed appropriate as it enabled collection of comparable data from the three countries while at the same time allowing for contextual differences [147, 149]. The cases in this study were the three countries: Burkina Faso, Ghana and Tanzania. Case studies are useful in the early, exploratory stages of research [170] which was the context for Study I which was conducted in preparation for the development of the CDSS for maternal care to be implemented in the three countries [154]. Two key features of a case study are the reliance of multiple sources of evidence and the benefit of prior development of theory to guide data collection and analysis [147]. While no prior theory was developed for this study; a conceptual framework was developed to aid analysis of results and to perform the cross-country comparison. This framework emanated from the objectives of the study, the analysis itself, and also utilised constructs from a framework of the attributes related to CPG implementability [143] (Fig. 6). The framework describes the process from the development and production of guidelines, to health workers' access to and use of them; influenced by their content, usability, applicability and adaptability.

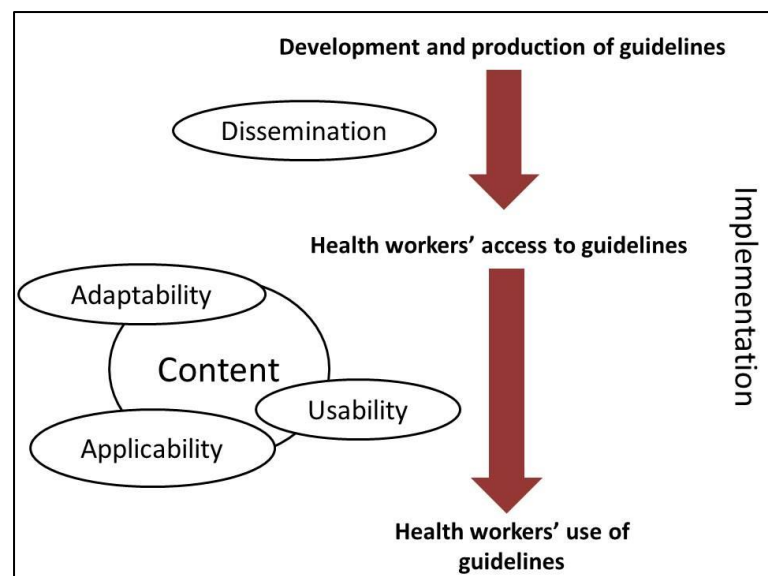


Figure 6: Framework for cross-country comparison of Clinical Practice Guidelines

6.3.2 Cross-sectional bottleneck analysis (Study II)

In Study II, cross-sectional data from the EQUIP surveys were used to estimate effective coverage and bottlenecks in the implementation of five key maternal and newborn health interventions. The approach to analysis was developed as part of the study where the model, labelled *the implementation pathway*, was an adaptation of the original Tanahashi model. The implementation pathway allowed for estimates of actual, or achieved, coverage of an intervention in three conditional stages of its implementation (Fig. 7). Bottlenecks were identified from the absolute attrition in coverage between these stages and designated as bottlenecks in *access*, *health facility readiness* or *clinical practice*.

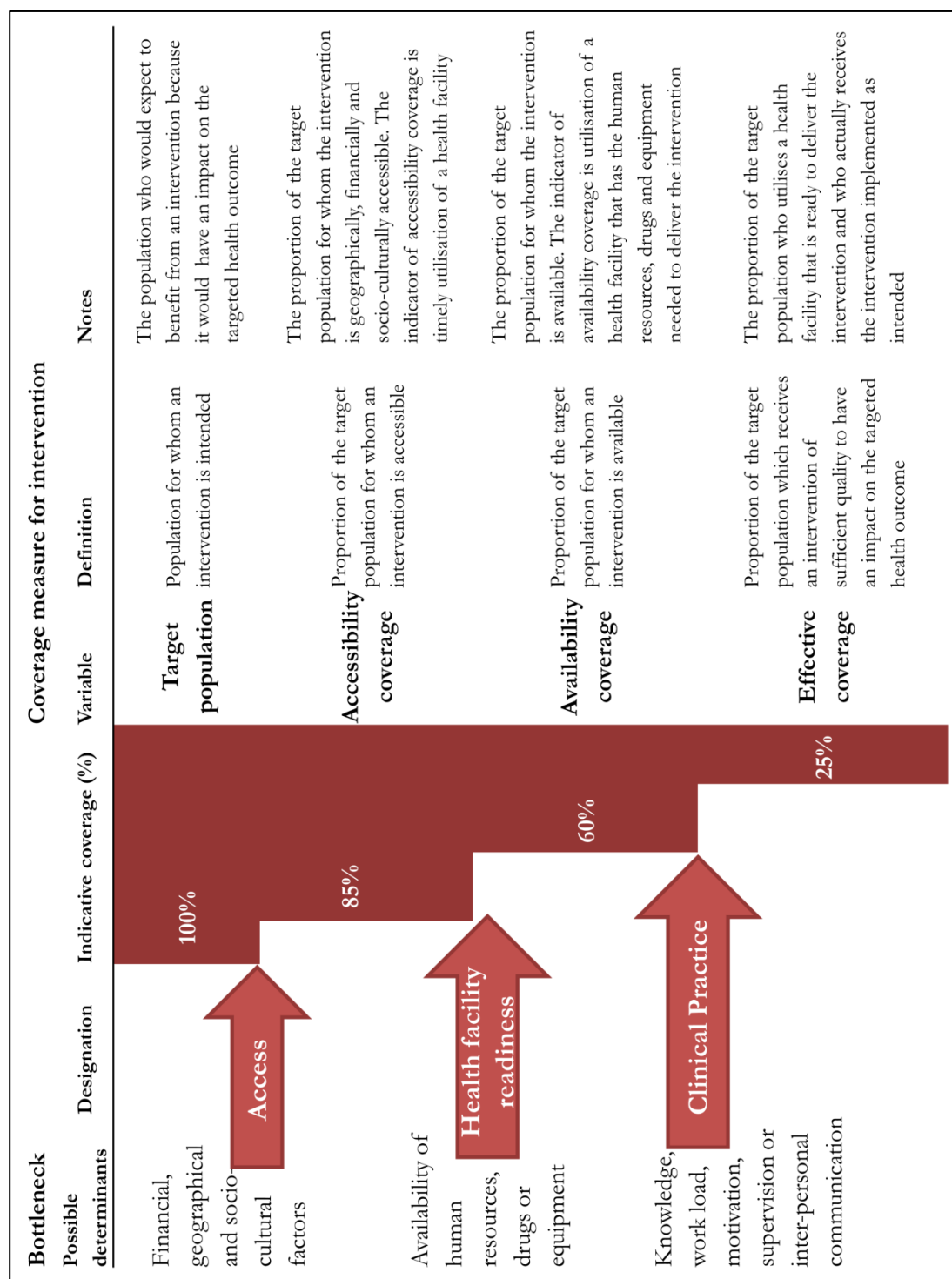


Figure 7: Implementation pathway

6.3.3 Qualitative study using a grounded theory approach (Study III)

Study III was a qualitative study using a grounded theory approach to analysis [152]. Grounded theory was developed in the 1960's to enable theory-building from empirical data and has been described as *“systematic, yet flexible guidelines for collecting and analysing qualitative data to construct theories from the data themselves”* [152, 171].

The steps of grounded theory include an initial open sample of participants, followed by theoretical sampling based on the theories emerging through concurrent data collection and analysis. Initial open, inductive, coding is followed by focused, more deductive coding, categorising and theory building in an iterative process [152]. In this way, the researcher will construct a theory which is grounded in the data [152].

Grounded theory is useful when the aim is to contribute to knowledge about a phenomena which is broader than and relevant to a wider context than the immediate setting of the study [170]. In Study III, the objective was to gain an understanding of the fundamental conditions for care provision and what constitutes quality of maternal and newborn care from a health worker perspective in a low-resourced rural health system. Transcending individual health worker accounts to identify a common thread made the use of a grounded theory approach for analysis ideal.

6.3.4 Qualitative process evaluation (Study IV)

Study IV was a qualitative process evaluation of the EQUIP intervention in health facilities. The objective was to investigate which components of EQUIP met the needs of health workers and therefore contributed to the mechanisms of effect of the intervention. The Medical Research Council (MRC) has outlined this as one of three areas of focus for process evaluations, the other two being context and implementation [139]. Process evaluations are vital in the quest to illuminate the “black box of implementation”, to be able to learn about *how* interventions work, not just *if* they work [139, 172]. To this end, the causal assumptions underlying the intervention should be articulated in a detailed logic model [172]. For the purposes of Study IV, the original EQUIP logic model [155] was disaggregated to outline the health facility component in more detail (Fig. 8). In this logic model, the seven elements of collaborative QI [120] as previously described are indicated, as are the four constructs of i-PARIHS [141], the framework used for analysis. The grey-shaded boxes contain the core intervention components, with arrows representing the relationship between these. Hypothesised mechanisms of effect are contained within the dashed boxes and the intended outcomes in the red-shaded box. The red dashed box illustrates the focus for the process evaluation in Study IV.

**i-PARIHS
constructs**

**Collaborative QI
7 elements**

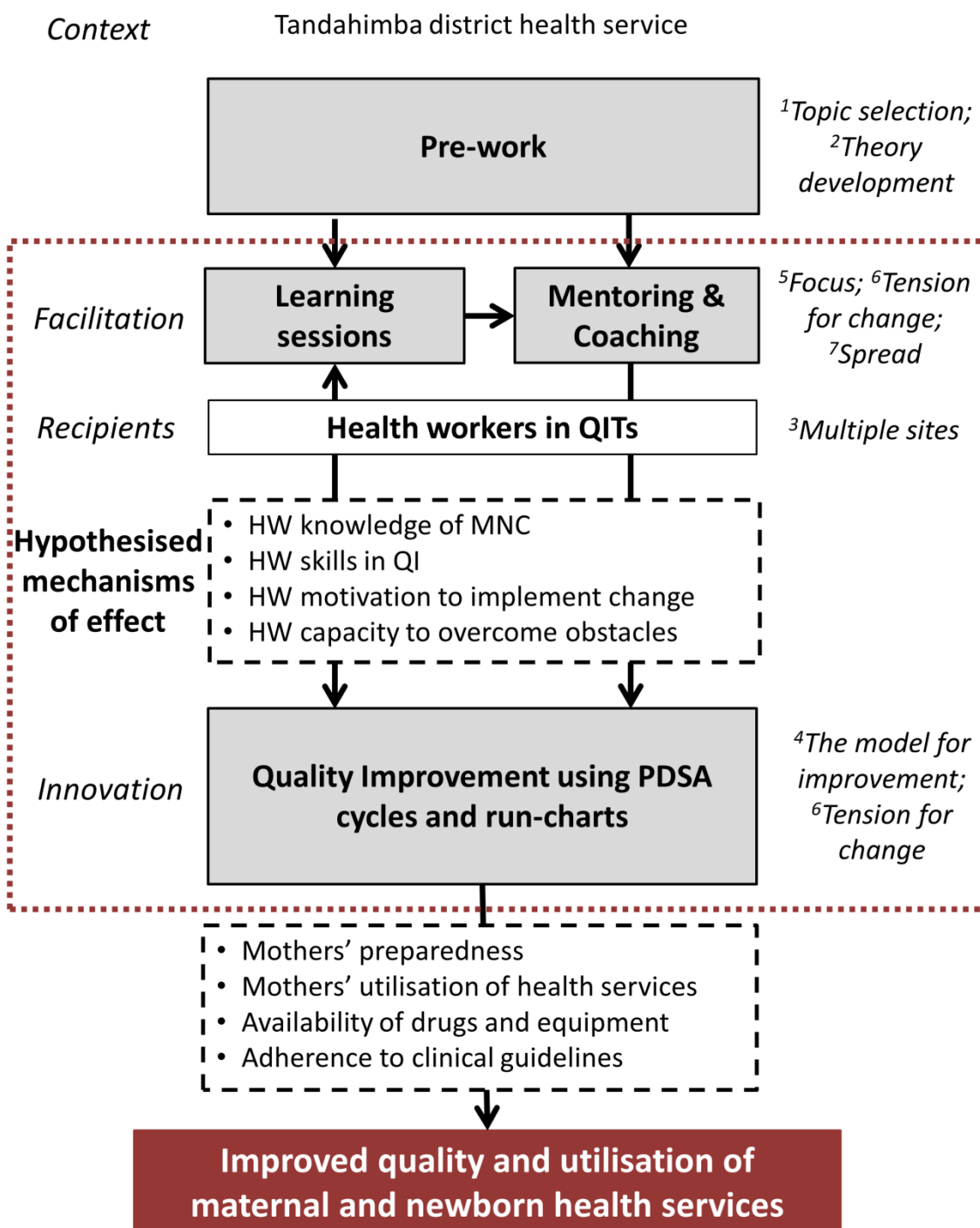


Figure 8: Logic model of EQUIP intervention in health facilities

6.4 DATA COLLECTION AND ANALYSIS

6.4.1 Study I

This multiple case study employed two different methods of data collection and analysis. The first was a document review of national maternal health CPGs corresponding to the contents of the WHO guideline *Pregnancy, Childbirth, Postpartum and Newborn Care: A guide to essential practice (PCPNC)* [173]. Collation of guidelines was carried out with the help of local research partners and representatives from Ministries of Health and Non-Governmental Organisations (NGOs) involved in guideline development.

CPGs were analysed in two stages. In the first stage, a review of content was conducted using a data extraction checklist corresponding to the relevant sections of the PCPNC guidelines. It included sections B9-E on emergency care in pregnancy, bleeding in early pregnancy, antenatal care, labour, delivery and postpartum care [173]. Each of the identified CPGs was compared to the contents of these sections and any deficiencies or discrepancies in recommendations written down in a grid. In the second stage, an assessment of CPGs format was made in terms of their level of usability and applicability; both attributes that affect the use of CPGs in practice [143]. Usability was assessed based on indexing and ease of navigation, format of text and the availability of treatment and management algorithms. Applicability was assessed based on the availability of management and treatment algorithms for individual patients at different levels of care, and on the inclusion of a Partograph.

During the second part of data collection and analysis, semi-structured interviews were held with a total of 28 key informants, the sampling of which was purposive but also included an aspect of snowballing (Table 3). The aim was to capture the views of key stake holders with knowledge of and responsibilities to develop maternal health guidelines.

Table 3: Key informant characteristics

Key informant category	Burkina Faso	Ghana	Tanzania	TOTAL
Government level	3	1	1	5
Regional level	1	1	0	2
District level	1	2	0	3
Health facility level	5	2	0	7
NGOs including WHO and other UN agencies, faith-based and civil society organisations	1	4	6	11
TOTAL	11	10	7	28

Interviews were analysed using thematic content analysis [174, 175] with the help of Nvivo9 software [176]. After familiarisation with the data, transcripts were sorted into content areas and sections relating to CPGs were further analysed to identify themes. These were identified deductively, based on the interview guide, and inductively from what emerged from the analysis of transcripts. Within each theme further analysis took place to identify codes and

categories. Data from each country was initially analysed independently and the cross-country comparison was conducted in the last stage with the help of the framework.

6.4.2 Study II

Study II used data collected by the EQUIP surveys [151]. The household survey involved continuous cluster sampling. Each month, 10 household clusters were selected with the probability of selection being proportional to the population size in the district. Within each cluster, 30 households were selected by simple random sampling. Interviews were held with the head of the household and with all resident women aged 13 to 49 years and a special interview module was used for women who had recently had a live birth. Questions on care seeking, treatment and outcomes during pregnancy and childbirth were included. The health facility census, which was repeated every four months, used a checklist to assess readiness. In addition, interviews were conducted with the head of each facility on the services offered and the routine care provided. The health worker who had attended the most recent delivery in the facility was interviewed about the actions and care provided to the mother during childbirth.

Household data collected between November 2011 and December 2012 and health facility data from one census conducted between April and July 2012 were used for analysis. Women who had had a live birth in the 12 months before the survey were included (Table 4).

Table 4: Sample size Study II

Time period of data collection	Entity or individual assessed	No.		
		Tandahimba District	Newala District	Total
November 2011 – December 2012	Households interviewed in the survey	3436	3494	6930
	Women of reproductive age (13-49 years) interviewed	3196	2979	6175
	Women who had had a live birth in the 12 months before the survey	400	372	772
April – July 2012	Health facilities covered by the census	32	28	60
	Health workers interviewed	39	31	70

Five key maternal and newborn health interventions, all recommended by the WHO to be delivered through health facilities [37], were investigated. These included *Syphilis screening*, *Pre-eclampsia screening*, use of *Partograph* to monitor of labour, *Active Management of the Third Stage of Labour* (AMTSL) and *Postpartum care* in a health facility.

For each intervention, coverage for the stages of the implementation pathway was calculated by dividing the number of individuals who satisfied the conditions for implementation at a particular stage by the target population. Depending on the intervention, the target population

was defined normatively as either all women who were pregnant or all women who gave birth during the study period. Table 5 outlines how coverage measures for each intervention and each stage was estimated.

Accessibility coverage was estimated using data on utilisation from the household survey. Availability coverage was estimated by multiplying indicators of utilisation from the household survey by indicators of health facility readiness; both indicators stratified by health facility level (hospital, health centre or dispensary). For example, the proportion of mothers who attended ANC in a dispensary was multiplied by the proportion of dispensaries able to deliver the intervention. The stratified results were combined to derive the overall availability coverage for each intervention. For effective coverage, indicators of antenatal and postpartum interventions were derived from interviews with mothers and indicators of intrapartum interventions were derived from health workers' reports; also stratified by health facility level.

Bottlenecks in implementation were identified from the absolute attrition in coverage between one stage and the next. Major bottlenecks were assessed as those causing attrition in coverage of 30% or more. All statistical analyses were performed using Stata version 12 (StataCorp. LP, College Station, United States of America). Proportions and confidence intervals (CI) for indicators from the household survey were computed using the "svy" command to adjust for the effect of clustering. CIs were not computed for the coverage measures because, apart from accessibility coverage, as all measures were derived from a combination of survey and census data.

Table 5: Target populations and coverage measures for maternal and newborn health interventions

Key interventions					
Target population	Syphilis screening	Pre-eclampsia screening	Use of Partograph	AMTSL	PPC in a health facility
	All women during pregnancy	All women during pregnancy	All women during childbirth	All women during childbirth	All women after childbirth
Coverage measures					
Accessibility coverage	Proportion attending ANC at least <i>once</i> during pregnancy	Proportion attending ANC at least <i>three</i> times during pregnancy	Proportion giving birth in a health facility	Proportion giving birth in a health facility	Proportion giving birth in a health facility
	... in a health facility with a syphilis test available	... in a health facility with a Sphygmomanometer available	... with a Partograph available	... with sterile syringes and needles and Oxytocin or Ergometrine available	... offering postpartum care with iron supplements available
Availability coverage	... who report having a blood test and receiving a test result for syphilis	... who report having their blood pressure checked	... where a health worker reported using a Partograph during the last delivery attended	... where a health worker reported giving an oxytocic agent during last delivery attended	... who report being checked within 48 hours of delivery
Effective coverage	... who report having a blood test and receiving a test result for syphilis	... who report having their blood pressure checked	... where a health worker reported using a Partograph during the last delivery attended	... where a health worker reported giving an oxytocic agent during last delivery attended	... who report being checked within 48 hours of delivery

6.4.3 Study III and IV

Data collection for Study III and IV was conducted simultaneously. In-depth interviews were conducted with 17 health workers providing maternal and newborn care in 14 purposively sampled health facilities in February 2014 (Table 6). The sample reflected different cadres of health workers, levels of health facilities and functionality of EQUIP QITs as assessed by the EQUIP mentors with the aim to achieve variation in the data. The assessment of QIT functionality was conducted at the end of the intervention period. It was based on rating seven aspects of QIT capabilities such as knowledge of new improvement topics, PDSA cycles, work plans, change ideas and the use of run-charts.

Table 6: Characteristics of health workers interviewed

Cadre of health worker	Health workers interviewed			Hospital	Health centre	Dispensary
	Female	Male	Total			
Medical attendant	3		3		1	2
Nurse/midwife	9		9	2	3	4
Clinical officer	1	3	4			4
Assistant Medical officer		1	1	1		
TOTAL	13	4	17	3	4	10

The interview guide had two sections where the first part focused on the experiences of providing maternal and newborn care in Tandahimba district and the second on health workers' involvement in the EQUIP intervention (Additional file). The second part, used for the process evaluation, included more focused questions and prompts whereas the first was more exploratory. The interview guide was adapted after the first interviews as some questions did not yield sufficient response and to reflect new ideas emerging during the data collection.

Before conducting the interviews, permission was obtained from the District Medical Officer in Tandahimba district. Health workers were approached in advance and asked about their willingness to participate. A time for the interview was agreed at which informed written consent was sought. All approached respondents chose to participate. Interviews were held in a private area of the health facility with only the respondent and interviewers present. Interruptions to allow respondents to attend to their patients were made. The median effective interview time was 1 hour 12 minutes (range 1 hr 3 min to max 2 hrs 7 min).

Interviews were co-conducted in Swahili, audio recorded, transcribed verbatim and subsequently translated into English.

6.4.3.1 Grounded theory approach to analysis

A grounded theory approach to analysis was used in Study III [152]. After reading through all transcripts to capture the whole, these were coded inductively using *open coding* close to the text to capture ‘what was going on’ [171]. Similar codes were categorised into higher order categories. After analysing half of the transcripts, a code list was prepared to harmonise emergent codes and categories. Subsequent transcripts were coded applying these new codes and categories where possible, using *focused coding*. Concurrently, *theoretical coding* was applied early on, initially using the conditional matrix by Corbin and Strauss [171, 177], focusing on the conditions in which health workers provide care and the consequences these conditions have for care provision. As the analysis progressed, theoretical coding continued using the concepts of *mothers’ utilisation of care*, the *availability of resources* in health facilities and the actions taken by health workers, i.e. *clinical practice*, as it became apparent that the data fitted well into these categories. Main categories contained health worker perceptions of the conditions for care provision and their perspectives of what constitutes good quality care. All main categories were linked to the core category. As the core category emerged, interviews were also reread to find more examples of the core category and to saturate the description of the links between the core category and the main categories. Data analysis was conducted with the help of Microsoft Word 2010.

6.4.3.2 Deductive theory-driven analysis

For Study IV, qualitative content analysis was conducted applying a theory-driven deductive approach [153] using the i-PARIHS framework [141] as a lens. As facilitation, through mentoring and coaching and learning sessions, was a core component of the EQUIP intervention, i-PARIHS with its focus on facilitation as the active ingredient of implementation was deemed appropriate to direct the analysis.

In the first stage, all transcripts were sorted into content areas corresponding to the i-PARIHS constructs *innovation*, *facilitation*, *context* and *recipients* [141]; using the high-lighting function in Microsoft Word 2010. Highlighted paragraphs were then pasted into four Microsoft Excel 2010 spread-sheets, preserving information on interview number and transcript line. In the second stage, paragraphs were further analysed deductively using the characteristics of each i-PARIHS construct [144] and the text condensed into meaning units. In the last stage, codes were applied to meaning units and grouped into themes. Not all characteristics of each i-PARIHS construct were represented in the material and the same themes were sometimes reflected in more than one characteristic. For the latter reason, some characteristics were merged in the results. In the last stage of analysis, themes within the i-PARIHS constructs of innovation and facilitation were contrasted between health facilities assessed by EQUIP mentors as having a high and low functionality of QITs. Components that were perceived similarly regardless of QIT functionality were interpreted as key contributors to mechanisms of effect of the intervention.

6.5 ETHICAL CONSIDERATIONS

All ethical permits for the studies within this PhD thesis were secured from ethical review boards in the three study countries. Research for Study I was conducted under the general ethical approval for the QUALMAT project (work package 2) in Burkina Faso (Ministère de la Santé, Ministère des enseignements secondaire supérieur et de la Recherche Scientifique pour la recherche en santé. Comité d’Ethique, Deliberation No 2010-31), Ghana (Navrongo Health Research Centre Institutional Review Board. ID: NHRCIRB085) and Tanzania (Muhimbili University of Health and Allied Sciences (MUHAS) Directorate of Research and Publications, Ref. No. MU/RP/AEC/Vol. XIII). Research for Study II, III and IV was conducted under ethical approval from Ifakara Health Institute (IHI) Institutional Review Board (IRB) Ref: IHI/IRB/No: 30/2012 and from the National Institute for Medical Research (NIMR) in Tanzania Ref: NIMR/HQ/R.8a/Vol. IX/1704.

The ethical implications of the studies within this thesis were mainly related to the interviews of key informants (Study I) and health workers (Study III and IV). Informed consent was practiced in all cases, meaning that the respondents were informed about the purpose of the study and the nature of their participation. While all were informed that they could refuse participation or interrupt the interview at any time, this did not happen in any case.

Interviewing health workers in rural understaffed health facilities demands its own consideration. Is it reasonable to request time for an interview while patients, mothers and children are waiting? Will the time taken from health workers for an interview affect their work load negatively? For the interviews in Study III and IV, careful consideration was given to these risks, both for the individual health worker and for patients in the health facilities. Steps taken to minimise risks included contacting health workers in advance, to enquire about their willingness to participate; it is easier to say no to somebody on the phone than face to face. Health workers themselves suggested a suitable time for the interview and were encouraged to break off to see to patients and mothers in labour. This happened during a few of the interviews.

There were also perceived benefits for the health workers to participate in the interviews. Many of them work in remote settings, sometimes without colleagues. Sharing their experiences, being listened to and having their experiences documented and valued was mentioned as something positive by several of them after the interviews.

7 RESULTS

7.1 OVERVIEW

Table 7: Overview of thesis findings in relation to study objectives

Study	Objective	Findings
I	To compare attributes related to use of maternal health Clinical Practice Guidelines in Burkina Faso, Ghana and Tanzania, focusing on their content compared to WHO guidelines, format and development processes	The content of national CPGs correlated well with WHO guidelines. Development processes were overall participatory. The format of CPGs was assessed as mixed with the majority having a low to medium usability and applicability. The availability and use of CPGs by health workers in practice was perceived to be low.
II	To estimate the effective coverage of key maternal and newborn health interventions and to identify bottlenecks in their implementation in two rural districts in Tanzania	Linking household and health facility data can produce estimates of effective coverage. Using this data in a modified Tanahashi model applied at district level, can enable identification of the level of health system bottlenecks. Despite high accessibility coverage, effective coverage ranged between 3% and 49% only; the lowest for Postpartum care and the highest for AMTSL. With the exception of one intervention; bottlenecks in implementation were different between the districts but similar within districts.
III	To examine health worker perspectives of the conditions for maternal and newborn care provision and their perceptions of what constitutes good quality of care in rural Tanzanian health facilities	Health workers perceived unpredictability as the fundamental condition for all aspects of maternal and newborn care provision: mothers' access to and utilisation of health care is unreliable; availability of resources is uncertain and health workers have to help and try to balance the situation. Quality of care was perceived to vary as a consequence of these conditions. Health workers stressed the importance of predictability, of 'things going as intended', as a sign of good quality care.
IV	To investigate health workers' perceptions of the components of a collaborative quality improvement intervention in rural Tanzanian health facilities, in order to elucidate contributors to mechanisms of effect	Three key intervention components met the needs of health workers and were interpreted as contributing to mechanisms of effect of EQUIP in health facilities: a high degree of fit of improvement topics with existing practice; motivating effect of using run-charts to monitor progress; and iterative, integrated and empowering experience of facilitation through mentoring and coaching. From a health worker perspective, less importance was attached to the application of PDSA-cycles and attending learning sessions, suggesting that these components may contribute less to the mechanisms of effect in this context.

7.2 'HOW TO KNOW WHAT YOU NEED TO DO' (I)

7.2.1 Content and format of Clinical Practice Guidelines

Seven documents were identified for review (Burkina Faso, n = 2; Ghana n = 2; Tanzania n = 3) which together corresponded to the contents of the WHO PCPNC guidelines [173] in the respective countries at the time of our study (Table 8). Although not necessarily defined as CPGs, ANC cards were included as they were perceived to be the most available and used protocols by health workers in practice.

Overall, the contents of the national guidelines were similar to those of the WHO PCPNC. The few differences observed included: lack of a specific section on the management of ABC (Airway Breathing Circulation) in the Burkina Faso and Tanzanian guidelines; and deficiencies in guidance on how to respond to problems immediately postpartum in the Burkina Faso and Ghanaian guidelines.

The assessment of CPGs' format revealed varied usability and applicability. The Ghanaian *National Safe Motherhood Service Protocol* was the only CPG with a high level of usability and applicability; containing clear algorithms for clinical decision making at all levels of care and for all stages of pregnancy, childbirth, and postpartum periods. The Tanzanian *Emergency Obstetric Job Aid* similarly displayed a high level of applicability but only a medium level of usability. It contained clear algorithms and flow charts for decision making, but information was arranged according to obstetric diagnosis rather than clinical presentation. The Burkina Faso CPGs and Tanzanian ANC guidelines were assessed as having both low usability and applicability. Text was largely narrative with a mix of background information and treatment recommendations; few algorithms for decision making were included and navigation was difficult.

All ANC cards had a medium level of usability with the Ghanaian and Tanzanian ones including detailed checklists for antenatal, delivery, and postpartum care. Checklists in the Burkina Faso ANC card were more limited and did not include postpartum care or a Partograph, which were included in the Ghanaian and Tanzanian ANC cards. None of the ANC cards included algorithms for decision making, lowering their level of applicability and use for clinical decision making (Table 8).

Table 8: Clinical Practice Guidelines for maternal health in Burkina Faso, Ghana and Tanzania. Characteristics and assessment of format are outlined.

Country	Name of Guideline	Year of publication	Number of pages	Usability	Applicability
Burkina Faso	• Protocoles De Santé De La Reproduction - Santé de la femme et du nouveau-né de moins de sept (7) jours	2009	145	Low	Low
	• Carnet de Santé (ANC card)	-	35	Medium	Low
Ghana	• National Safe Motherhood Service Protocol	2008	128	High	High
	• Maternal Health Record Book (ANC card)	-	15	Medium	Medium
Tanzania	• RCH4 (Antenatal card)	2008	5	Medium	Medium
	• Emergency Obstetric Job Aid	2005	41	Medium	High
	• Focused Antenatal Care, Malaria and Syphilis in Pregnancy – Orientation Package for Service Providers	2002	146	Low	Low

7.2.2 Clinical Practice Guideline development, access and use

Three themes were identified during analysis: development of national maternal health CPGs, health workers' access to CPGs and health workers' use of CPGs. The first theme was part of the initial interview guide, whereas the second two emerged during analysis. Several categories emerged within each theme (Table 9).

7.2.2.1 Development of national maternal health CPGs

In all three countries, a participatory approach to CPG development was applied; reported to be carried out in cooperation between Ministries of Health and key stakeholders such as UN organisations, NGOs, clinicians, professional associations, and to some extent health representatives from districts and regional levels as well as universities.

In Tanzania and Burkina Faso, respondent perceptions however diverged as to whether sufficient participation had been achieved.

'Heads of districts are involved although one may say that they are not adequately involved. It is for the validation of the document but not for the development.' (MD, district level, Burkina Faso)

‘The revision was not participatory, that I have to tell you upfront [...] the updated ANC [guidelines] need to be looked at to see if they are in line with this [WHO guidelines].’ (Program officer, international NGO, central level, Tanzania)

WHO is a central partner for the development of guidelines in all three countries and no respondents believed there were any major differences in content between WHO guidelines and national CPGs, corroborating findings from the document review.

Table 9: Interview themes and categories

Themes	Categories
Development of national maternal health CPGs	<ul style="list-style-type: none"> • Multi-stage process • Varying degree of stakeholder participation • Good correlation with content of WHO guidelines
Health workers’ access to CPGs	<p>Perceived barriers</p> <ul style="list-style-type: none"> • Poor distribution • High staff mobility • Dependency on participation in training courses <p>Suggested solutions</p> <ul style="list-style-type: none"> • Pocket sized guidelines • Wall posters
Health workers’ use of CPGs	<p>Perceptions of use</p> <ul style="list-style-type: none"> • Low use of CPGs among health workers <p>Perceived reasons</p> <ul style="list-style-type: none"> • Attitudes towards continuing education • Limited effects of training • Non-userfriendly format of CPGs • Use of CPGs during patient consultations not seen as professional

7.2.2.2 Health workers’ access to maternal health CPGs

In Burkina Faso and Tanzania, health workers’ access to CPGs was perceived as limited. In Burkina Faso, one reason was perceived to be staff mobility. Health workers considered CPGs as personal belongings in the absence of a facility inventory of what guidelines should be in place.

‘Between planning and having means, there is a gap. There is a big gap. We plan, develop [guidelines], and when it comes to implementation, we are not able to sufficiently mobilise resources.’ (MD, government level, Burkina Faso)

In Tanzania, health workers' access to CPGs was perceived to be largely determined by their participation in training courses.

'They [health workers] use everything what they get! Because even the job aide it is not everywhere. So those who have been trained in LSS [Life Saving Skills Curriculum in Emergency Obstetric Care], those [course materials] are their job aides.' (Program officer, international NGO, central level, Tanzania)

7.2.2.3 Health workers' use of CPGs

In all three countries, respondents expressed doubts as to whether CPGs are used by health workers in practice; these perceptions were also mirrored in the few interviews with health workers themselves.

'As for the conducting of the delivery and then after that the postnatal care, that one I know it as a midwife, but for the actual laid down guideline, I don't know.' (Health worker, district level health facility, Ghana)

Reasons identified included health workers' attitudes towards continuing professional education in Burkina Faso; of health workers not endorsing and applying new guidelines unless attending a dedicated course or work-shop for this purpose.

'The issue of health workers requires a perpetual search of new knowledge or an updating. If at the end of the basic training at school, we do not open any document and we only expect workshops, there will be a problem.' (MD, government level, Burkina Faso)

At the same time, in Tanzania, the often disappointing outcomes of training courses were emphasised.

'... there were people trained by the ministry before we moved there [district hospital] and yet when we came there, nobody had followed them [the guidelines], they had gone back to what they were doing before, they were not practising what they had been taught.' (Program manager, international NGO, central level, Tanzania)

In both Ghana and Tanzania, respondents perceived the low user-friendliness of CPGs as a reason for why they weren't used. In Burkina Faso, another perception was that the use of guidelines during patient consultations wasn't seen as professional.

'... We have a problem on how to have permanently documents laid on consultation table. First of all, people think that it devaluates the fact of consulting with a paper before the patient while one must ensure what they are going to do is right.' (MD, government level, Burkina Faso)

7.3 EFFECTIVE COVERAGE AND IMPLEMENTATION BOTTLENECKS (II)

For the two health interventions delivered during ANC, Syphilis and Pre-eclampsia screening, effective coverage ranged between 12% and 28% only despite high accessibility coverage. Effective coverage of the two intrapartum interventions, use of a Partograph and AMTSL, ranged between 13% and 49%. Effective coverage was lowest for postpartum care within 48 hours. Newala district had higher effective coverage than Tandahimba district overall; the between-district differences being 17% or less (Table 10).

Table 10: Accessibility and effective coverage estimates

Health intervention	Accessibility coverage (%)		Effective coverage (%)	
	Tandahimba	Newala	Tandahimba	Newala
Syphilis screening	99	100	12	20
Pre-eclampsia screening	78	66	22	28
Use of Partograph	60	57	13	28
Active Management of the Third Stage of Labour	60	57	32	49
Postpartum care within 48 hours	60	57	3	4

The two districts shared the largest bottleneck for one intervention: access to AMTSL. In Tandahimba, *health facility readiness* was the largest bottleneck for all interventions apart from AMTSL. In Newala, *access* was the largest bottleneck for all interventions, apart from syphilis screening, where *clinical practice* was the largest bottleneck.

Bottlenecks and coverage estimates for the stages along the implementation pathway are illustrated for all five interventions in Fig 9-13. Major bottlenecks causing a drop in coverage of 30% or more are indicated.

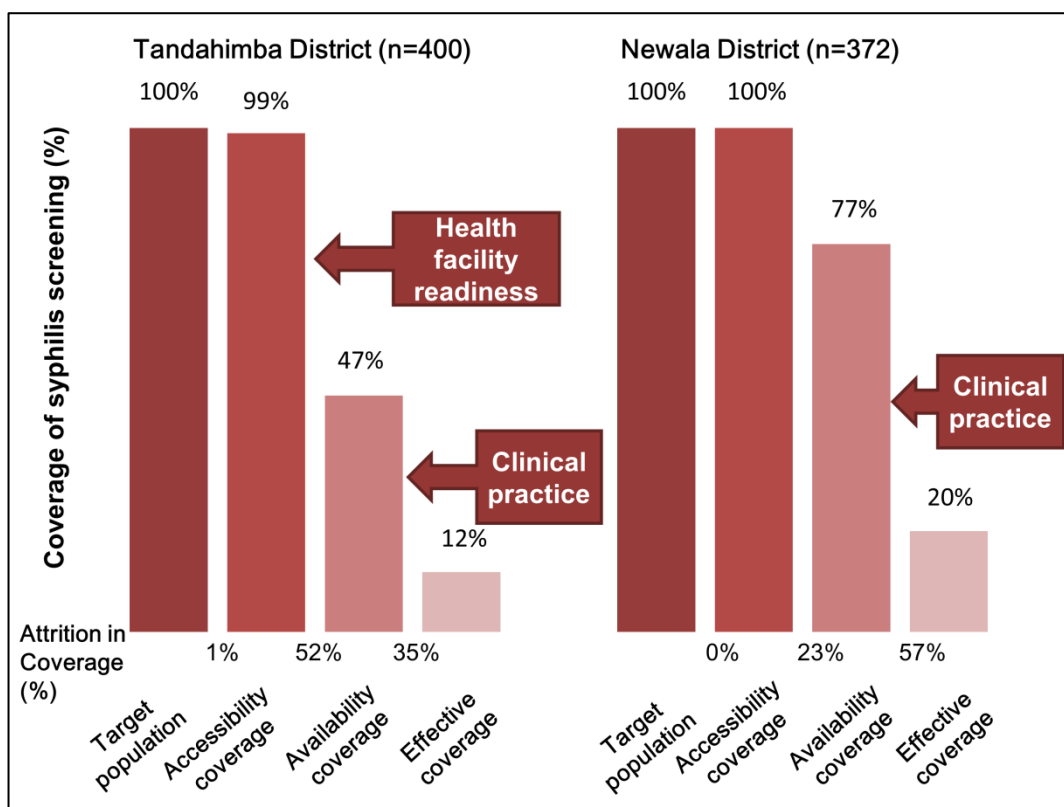


Figure 9: Syphilis screening

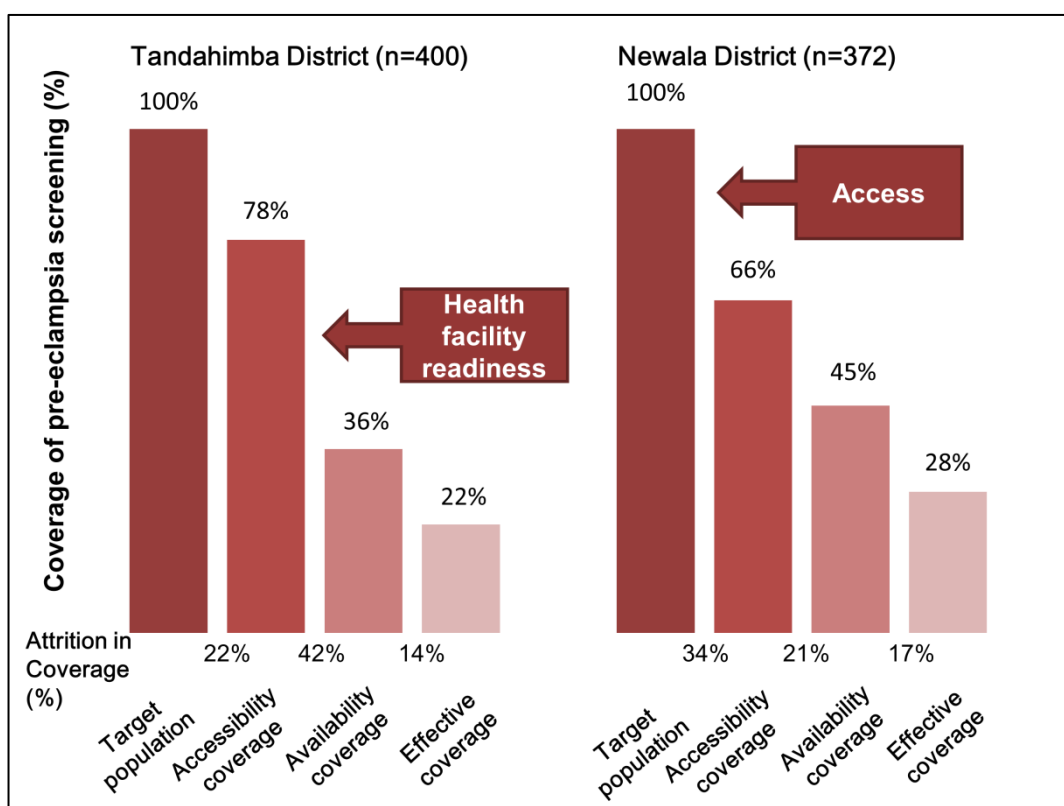


Figure 10: Pre-eclampsia screening

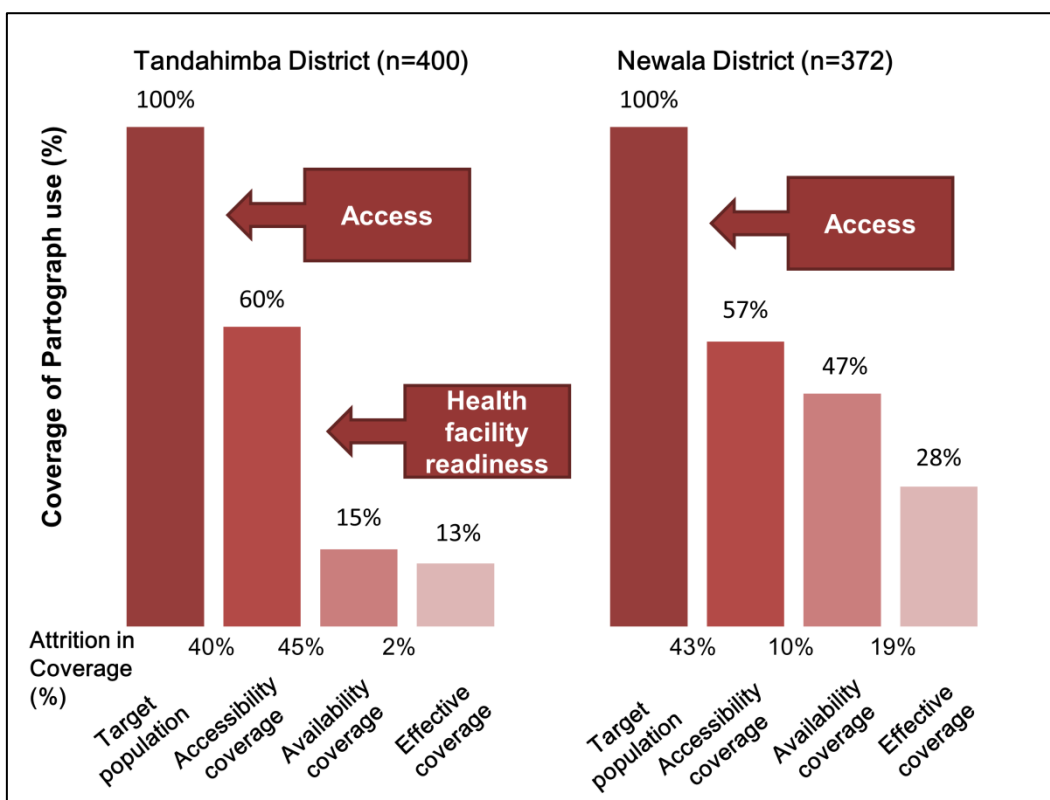


Figure 11: Use of Partograph

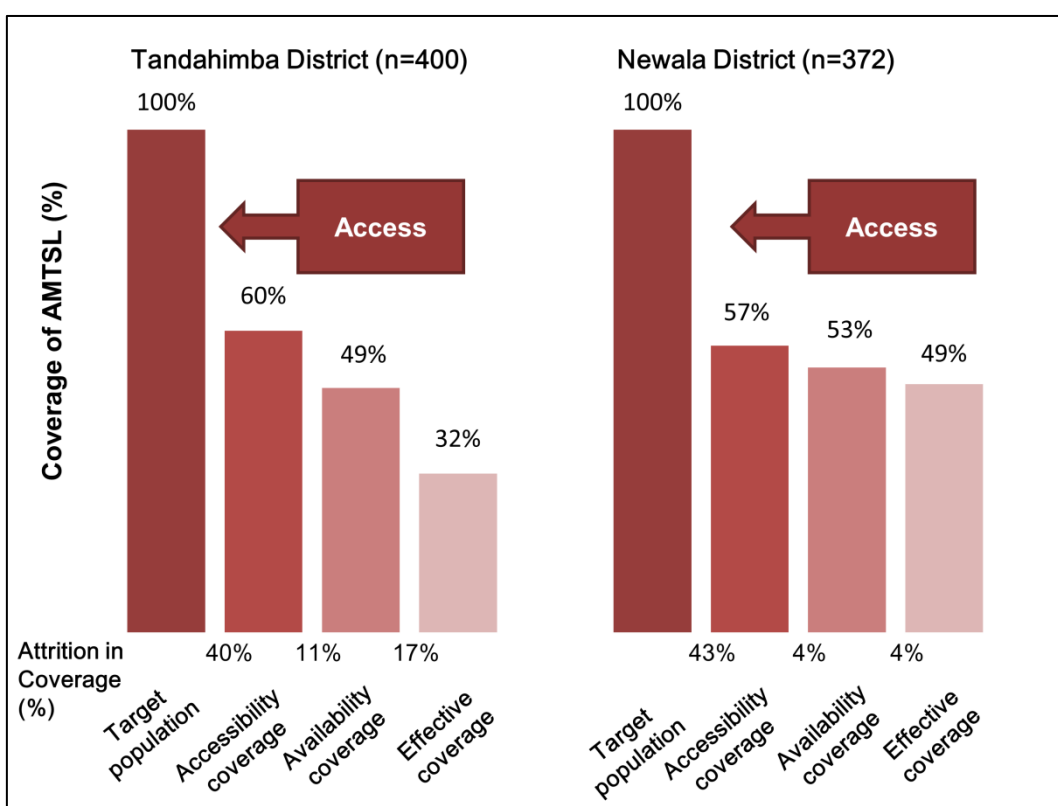


Figure 12: Active Management of the Third Stage of Labour

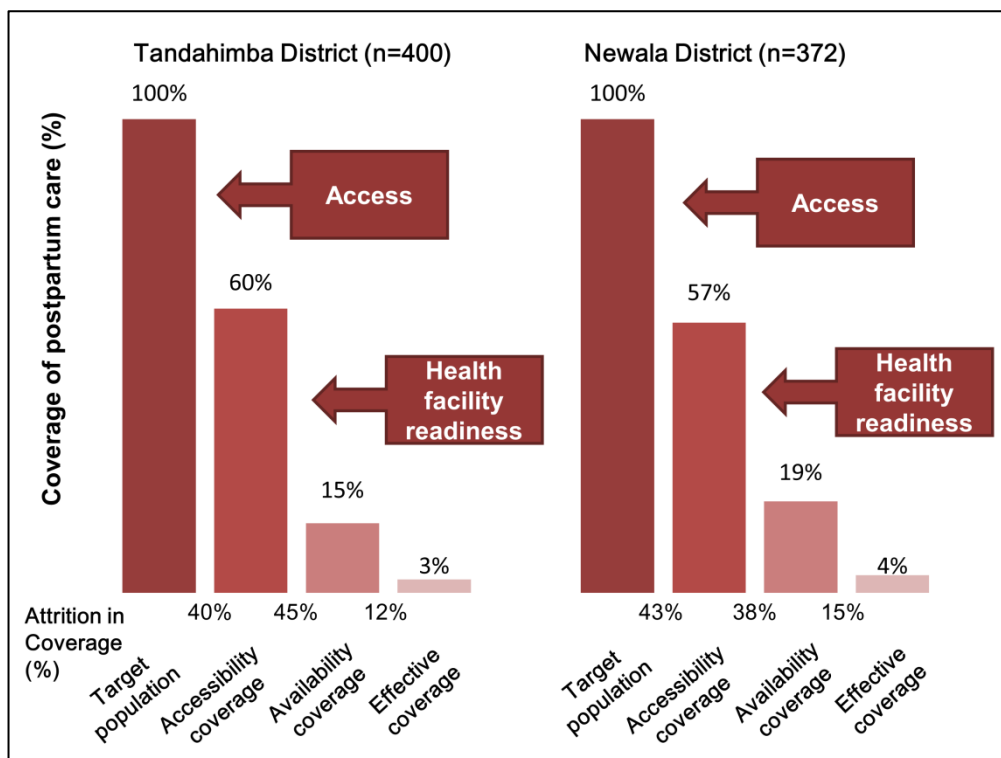


Figure 13: Postpartum care within 48 hours

7.4 UNPREDICTABILITY DICTATES QUALITY OF CARE PROVISION (III)

Unpredictability was revealed as the fundamental condition determining all aspects of maternal and newborn care provision; expressed by one health worker as *'it is like rain'*, which was chosen as the label for the core category. Four main categories were linked to the core category: *'uncertain availability of resources'*, *'unreliable utilisation of care by mothers'*, *'health workers have to help'* and *'unpredictable outcomes of care'*. Each of these contained two sub-categories: one containing the conditions that challenge care provision or perceptions of poor quality care, and one containing enabling conditions or perceptions of good quality of care. The results are outlined in figure 14.

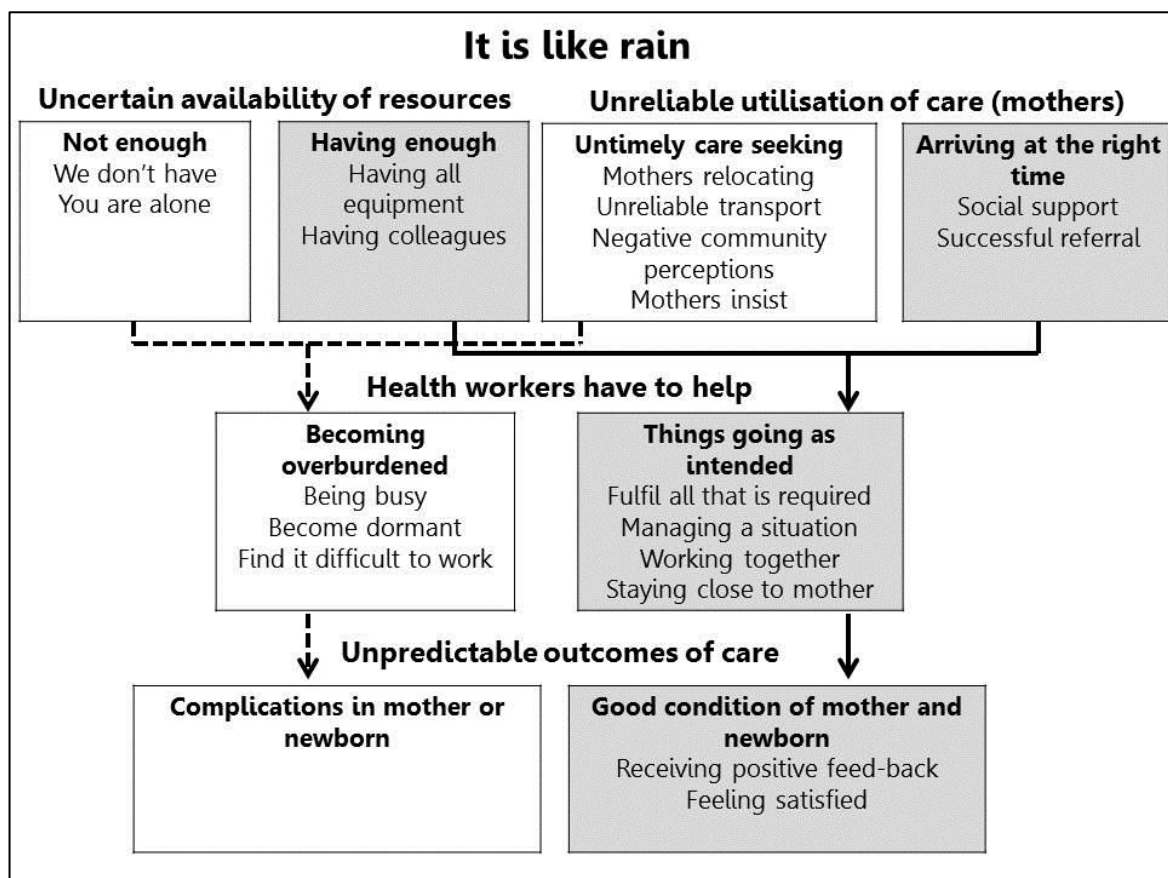


Figure 14: Results framework

'It is like rain' is the core category. The four main categories are outlined in bold with sub-categories contained within the boxes below. Sub-categories in white boxes are the ones perceived to challenge quality of care while those in grey boxes are perceived to represent conditions for or signs of good quality care. Codes within sub-categories, where applicable, are listed within the boxes. Arrows between boxes illustrate relationships between categories: dashed lines emanate from white boxes and full lines from grey.

7.4.1 It is like rain

The essence of ‘it is like rain’ is the inherent unpredictability of the conditions determining maternal and newborn care provision, as perceived by health workers. One cannot be certain that mothers will come at the right time or that transport will be available. One cannot depend on a regular supply of sufficient drugs or functioning equipment. Colleagues may or may not be available to help manage an unforeseeable work load or a difficult case.

‘It is like rain’ also represents a sense of being out of control; that circumstances are dictated from higher levels of the system while as a health worker, one is left with no choice but to handle the situation on the ground. Health workers’ perceptions of these conditions are closely linked to how they identify good quality of care. When things go as intended, when circumstances are predictable and the system reliable, care provision is more likely to be perceived as successful.

7.4.2 Uncertain availability of resources

The availability of material and human resources was experienced as uncertain by health workers. Essential equipment and infrastructure was either not available, not in working order or not enough for the needs of the facility; often mentioned as the biggest challenge for maternal and newborn care provision. Being alone was also expressed as a critical determinant of health workers’ capacity to provide care; including a lack of colleagues, not having adequate knowledge and not being able to influence one’s working conditions. The perceptions of quality mirrored this uncertainty.

[...] you were eager to provide a good service as it is supposed to be, but you failed because of tools [...] so we are working in a very difficult environment.
(Health worker I17)

7.4.3 Unreliable utilisation of care (mothers)

Health workers perceived mothers’ utilisation of care as unreliable and determined by factors largely outside their control. Untimely care seeking practices were perceived to affect care provision negatively and be influenced by for example mothers’ relocating around the time of birth and unreliable transport.

[...] sometimes people are many because there are people coming here for farming activities, so you may get even ten people from Mtwara [...] (Health worker I5)

Mothers ‘arriving at the right time’ was experienced as an important factor for good quality care provision.

7.4.4 Health workers have to help

Health workers expressed having to help mothers regardless of whether resources were available or whether mothers arrived too late; the result being them trying to balance resources to be able to provide care. This would sometimes lead to a feeling of becoming overburdened.

I am medical attendant, but because of the problem [shortage of staff], I am also doing deliveries. I can't tell a patient that the midwife is not around so it is impossible. I must receive the patient. (Health worker I14)

Sometimes care provision would however be perceived as predictable and things would 'go as intended' which made health workers feel that good quality care could be provided.

If you attend a woman according to your estimation, you feel happy and proud. (Health worker I7)

7.4.5 Unpredictable outcomes of care

Health workers described varying outcomes of care as a result of these conditions. Many had experienced situations where a serious complication had occurred, which was experienced as stressful and deeply upsetting.

I tried to wipe the baby but the baby didn't cry at all and then the baby died. [...] I felt bad because she [the mother] carried the baby for 9 months and she got nothing. (Health worker I6)

Observing a mother and baby in a good condition was perceived as a sign of having provided good quality care. Receiving positive feed-back and feeling satisfied were other indicators of this.

7.5 COMPONENTS CONTRIBUTING TO MECHANISMS OF EFFECT OF COLLABORATIVE QI (IV)

The qualitative process evaluation of the EQUIP intervention in health facilities revealed that the majority of health workers had a high degree of internal motivation for their choice of profession. The context was characterised by several concurrently implemented external health programs; some of which, like EQUIP, focused on maternal and newborn care. Health workers experienced this as challenging in terms of identifying which programs did what and that, contrary to their own professional responsibilities, programs often only had one focus. At the same time, the presence of external programs in the health facilities was also experienced as positive.

The findings from Study IV suggest three key components which, regardless of the functionality of the QIT to which they belonged, met the perceived needs of health workers. These were therefore interpreted as major contributors to mechanisms of effect of the intervention.

The first component was the improvement topics which were perceived to have a high degree of fit with existing practice. Health workers perceived that these were within their responsibilities and that they had worked on them before and learnt about them in pre-service training and that they appreciated being reminded about their importance.

We were using these postnatal strategies even in the past, but they were not like the way they are now. [...] The significance and sensitisation of postnatal care has increased.
(Health worker I3)

The second component was the use of run-charts to monitor progress. Although their application varied between facilities, their use was consistently experienced as motivating. The ability to assess one's performance and the satisfaction of seeing results was experienced as a relative advantage compared to collating data to keep in files only.

You can assess yourself the way you have given services by looking at what you did the previous month and where you are now. I ask myself if I have been improving or not; have I delivered better services this month or not? (Health worker I9)

The third, and possibly the most important component was the iterative, integrated and empowering experience of the facilitation through mentoring and coaching. Health workers also felt that also the district's approach to supervision had changed following EQUIP.

Before I was very scared when you heard about supervision [from the district], you felt like running away because when they came here, they complained[...] but when they come [EQUIP mentors], the supervision perspective has changed [...] it is very polite
(Health worker I7)

Health workers' understanding and application of PDSA cycles varied substantially with a tendency of better understanding in health facilities with a high functionality of the QITs.

I would say you plan something and do, and act and what is another; I forgot one. S is for setting, you set. I have never used it. (Health worker II5)

From a health worker perspective, less importance was also attached to attending learning sessions compared to the mentoring and coaching visits in individual health facilities.

The findings therefore suggest that the components of using PDSA cycles and attending learning sessions may not meet the needs of health workers to the same extent as the other components, therefore contributing less to the mechanisms of effect of collaborative QI in health facilities in this context.

8 DISCUSSION

This thesis has investigated the quality gap in maternal and newborn care in Sub Saharan Africa; developing approaches to measure its characteristics, exploring its determinants, and evaluating strategies that could contribute to address these.

The approach developed to estimating effective coverage revealed that, despite the high proportion of mothers utilising health services, less than 50% received key MNC interventions in two rural Tanzanian districts. Implementation bottlenecks were similar within, but different between, districts. From the perspective of health workers, unpredictability in terms of health facility readiness, availability of colleagues and mothers' utilisation of care was identified as the fundamental condition for care provision and an important determinant of quality. The assessment of CPGs suggested that deficiencies in usability and applicability limiting their use by health workers in practice and therefore their potential to improve QoC. In rural Tanzanian health facilities, three components of collaborative QI were identified as meeting the needs of health workers, and therefore contributing to mechanisms of effect. These included improvement topics with a high degree of fit, the motivating use of run-charts, and empowering mentoring and coaching in individual health facilities.

8.1 LOW EFFECTIVE COVERAGE AND DISTRICT SPECIFIC BOTTLENECKS

Despite high accessibility coverage, the estimated effective coverage was below 50% for all investigated MNC interventions in Study II. The levels, however, varied substantially with a range of estimated effective coverage between 3% and 32% in Tandahimba district and between 4% and 49% in Newala district. The intervention with the highest effective coverage was AMTSL (32 % in Tandahimba and 49% in Newala) where in both districts, access was the largest bottleneck and the attrition in coverage due to poor health facility readiness or clinical practice, i.e. the quality gap, was small. This is an encouraging finding as the administration of Oxytocin immediately after childbirth, the indicator chosen to reflect AMTSL, is effective in preventing postpartum haemorrhage which accounts for 24 % of maternal deaths in SSA [10, 178].

The other four interventions reached an effective coverage of only 28% or less in both districts. Especially noteworthy is the low effective coverage of postpartum care within 48 hours in both districts: 3% in Tandahimba and 4% in Newala. Poor health facility readiness, caused by a lack of iron supplements, was a large bottleneck causing an absolute attrition in coverage of 45% and 38% in Tandahimba and Newala districts respectively. The inability of the health system to ensure consistent availability of iron, an essential and inexpensive nutritional supplement, has been confirmed in other studies from both Tanzania and other SSA countries [179, 180]. While this indicates an overall weakness of the health system, it is also an example of how disintegrated funding streams for maternal and newborn health commodities results in substantial variation in availability coverage depending on the area of care [81, 181, 182].

Whereas effective coverage of the five interventions was similar across the two districts, the patterns of bottlenecks were different. This finding points to a variability in local health system functioning, which would remain concealed by national or regional assessments. In Tandahimba, health facility readiness was the largest bottleneck for most interventions, whereas, in Newala, it was access to a health facility. This implies that the quality gap was smaller in Newala than in Tandahimba at the time of the survey; attrition in coverage due to health facility readiness and clinical practice were less important than the attrition in coverage due to limited access. The utility of conducting bottleneck analyses at the district level is strengthened by this finding. It also shows the importance of disentangling the reasons behind low effective coverage, in order to target the largest bottlenecks at the right level, which could result in greater improvements, contributing towards closing the quality gap. It also reveals an opportunity for cross-district learning. For example, in the context of similar resource levels and characteristics of target populations, how did Newala ensure better health facility readiness than Tandahimba for the same time period?

Clinical practice as a major bottleneck, causing an attrition in coverage of 30% or more, was only observed for Syphilis screening and treatment, the same finding in both districts. This suggests that limited access to care and poor health facility readiness were overall more important bottlenecks than clinical practice at the time of the study. This is an important learning point for QI interventions targeting health worker performance in a district where the main bottleneck is not clinical practice. It may also, as we shall see below, be demotivating for health workers to engage in QI activities in the context of an unsupportive system.

The starting point for the estimates of effective coverage and subsequent identification of bottlenecks in Study II was *accessibility coverage*, indicated by utilisation of care by mothers, either during pregnancy or childbirth. This differed from the original Tanahashi model where the sequence started with availability and then accessibility coverage [104]. The rationale for this adaptation was the aim of establishing a pathway where actual coverage could be measured at each stage of implementation rather than the health system's capacity or potential output. Acceptability coverage, the third stage in Tanahashi's sequence, was in Study II considered a determinant of accessibility coverage rather than its own stage of implementation. Poor acceptability, for example due to disrespectful care, would then contribute to a bottleneck in access, causing low accessibility coverage. Similar reasoning lay behind the change of the definition of accessibility coverage. In Tanahashi's model this represented potential access, for example financial or geographical, but in the implementation pathway it is conceptualised as a determinant of actual accessibility coverage measured by utilisation of health services.

The *implementation pathway* developed in Study II recognises the conditional nature of the health system building blocks; their complex interdependency in producing effective coverage of key interventions. It focuses on the output of the health system, rather than its capacity. Other approaches to identifying bottlenecks, such as that used by UNICEF, measure the constituent components of effective coverage, for example the proportion of trained

health workers within a certain area of care [106]. The implementation pathway, on the other hand, sees training as a determinant of clinical practice which could be further investigated *if* clinical practice emerged as a major bottleneck. Training would then be seen as one among many determinants. Through acknowledging the conditionality of health care utilisation, health facility readiness and clinical practice to produce effective coverage, the implementation pathway provides insights into the *level* of bottlenecks. This approach can then direct further quantitative and qualitative analyses to reveal the determinants of the bottlenecks. While in this thesis, the bottleneck analysis accessed high quality local data from both households and health facilities, this is a rare opportunity. It would, however, be possible to conduct a similar analysis focused on those women and newborns accessing health facilities only, which would be of great relevance for the quality gap. UNICEF for example is moving towards the use of facility-based health data rather than that collected through household surveys for maternal and newborn care (personal communication Stefan Peterson). Concurrent strengthening of HMIS data would then be needed.

8.2 UNPREDICTABILITY DICTATES CARE PROVISION

While health facility readiness was identified as a major bottleneck for effective coverage in Tandahimba district, the analysis of health workers' perspectives suggests that this readiness is not only insufficient, but uncertain and varies over time; something which cannot be easily detected in cross-sectional studies. This perception of unpredictability has however been reflected in quantitative assessments of drug stock-outs and of fluctuations in availability over time in many SSA countries [81, 183-187].

Unpredictability was indeed identified as the fundamental determinant for maternal and newborn care provision; permeating all aspects of the district health service, not only in terms of health facility readiness (availability of drugs and colleagues in the health facility) but also in terms of mothers' utilisation of care. The concept of unpredictability implies a lack of knowledge of future circumstances; whether and when a situation will change and what its characteristics may be. It offers an alternative view of what characterises a weak health system; its features not being merely a lack of resources or deficient processes, but a fluctuation in the level of these resources and processes over time. Health workers perceive these conditions as being largely outside their control while at the same time being responsible for consistent provision of health services on the ground.

Unpredictability may affect care provision negatively even at times when for example necessary drugs are available [185, 188]. This can be referred to as 'street-level bureaucracy' where the unpredictable circumstances necessitate a change of practice initiated by health workers themselves, sometimes against the recommended guidelines [189]. This phenomenon is well illustrated by health workers' expression of 'having to help' regardless of whether the surrounding system supports the care they are expected to deliver. A concrete example is 'rationing' of syphilis tests; rather than testing all pregnant mothers, health workers reserve tests for those who display any symptoms of illness [81]. This may also be the reason why clinical practice was identified as a large bottleneck for Syphilis screening

and treatment in both districts. As well as affecting clinical practice in a direct way, the unpredictable availability of resources also affects motivation negatively; which in turn has implications for clinical practice [190]. This finding has also been made in other studies from the same area of Tanzania [191, 192], and studies from other areas of the country have found that health workers feel abandoned and unsupported by the system [191, 193].

Sustainability is a concept which is related, but not equal to, that of unpredictability. Sustainability can be seen as the ability of a health program to maintain its services over time, to integrate activities into routine services and to continue when external financial support ceases [194]. Sustainability is frequently recognised as a challenge in SSA health systems where failures to sustain program activities have been linked to limited local ownership, time-bound financing or lack of an integrated plan to sustain the program over time [195-197]. Such failures contribute significantly to the unpredictability within health systems.

While the discontinuation of a health program's support and activities contributes to unpredictability, so does the introduction of new initiatives into a health service. While the management level, in many instances the district in SSA, may be involved in the planning of such programmes, front-line health workers are more commonly presented with a 'fait accompli' of new practices or responsibilities falling on their shoulders [198]. The plethora of programmes and partners often operating within the same district may further aggravate this tendency [73]. This is commonly found in Tanzania and in the context of QI strategies, this situation has been described as potentially harmful through causing duplication, inefficiency and a feeling of confusion among front-line health workers [73, 199-201].

Closely linked to the perception of unpredictable conditions, are health workers' views that quality of care is when 'things go as intended'; suggesting that when care provision is predictable, it is considered good. A similar finding was made in a Malawian study where health workers expressed quality as giving care "*in the right way, at the right time, with the right resources, to the right woman*" [202]. Predictability may indeed be an essential component of QoC in low resourced settings. Health workers' perspectives are crucial as their understanding of quality may differ from that of externally prescribed standards, or from the expectations of mothers and their families [202]. Understanding their perspective can provide a foundation for developing common goals and to inform indicators used for evaluations of QI initiatives. It can also aid in interpreting the successes or failures of the implementation of QI interventions.

8.3 STRATEGIES TO IMPROVE QUALITY

The effectiveness of QI interventions is modified by the context in which they are introduced [203]. The findings of implementation bottlenecks being different between districts, and unpredictability being perceived as a fundamental determinant for care provision, provide important insights for the interpretation of findings from the studies I and IV where CPGs were assessed and collaborative QI evaluated.

8.3.1 Content and usability

In this thesis, attributes of CPGs that have shown to affect their implementation in practice were assessed [204-207]. While the content correlated well with WHO guidelines in all three countries, the levels of usability and applicability varied. These attributes indicate whether CPGs are user-friendly, whether the recommendations for management are clear, easy to follow and possible to apply to individual patient contacts. The Ghanaian guidelines included clear algorithms to aid decision-making as did the Tanzanian Emergency Obstetric Job Aid. This was not the case, however, in the Burkina Faso guidelines and the Tanzanian ANC guidelines. These findings suggest that the often lengthy processes of adapting WHO standards to national settings would benefit from less focus on content in favour of the format of guidelines, to increase their potential for health workers to use in practice and therefore to improve QoC [208].

Apart from the limitations revealed in CPGs format, their distribution, and consequently health workers' access to them, was perceived to be problematic, especially in Burkina Faso and Tanzania. This is an experience shared by many other low-income settings, largely due to the inadequate resource allocation for guideline implementation [209, 210]. In all three countries, the use of guidelines by health workers in daily practice was perceived to be limited. This is not, however, a surprising finding. It is clear that without accompanying implementation strategies, CPGs on their own will remain but a starting point to improve QoC [122]. WHO, in their new *Standards to improve quality of maternal and newborn care in health facilities* recognises this fact through a special supplement on implementation strategies [58]. They do also, however, emphasise the need for national adaptation processes of the standards themselves. While such processes are both necessary and inevitable, greater emphasis should be put on the implementation strategies to achieve the standards.

8.3.2 High degree of fit, motivation of progress and empowering mentorship

Health workers had a high degree of satisfaction for three of the intervention components in the EQUIP QI intervention, regardless of the functionality of the QITs to which they belonged. These components were interpreted as meeting the needs of health workers in their professional roles, and therefore contributing to mechanisms of effect of the intervention.

The first component was that of the chosen “improvement topics”, the content of the improvement work, in EQUIP. These had been purposefully aligned to national guidelines and health workers perceived them as having a high degree of fit with their responsibilities

and routine work. Overall, they perceived them as something they were supposed to do, rather than something new to be expected of them on top of their usual responsibilities. The importance of content was also illustrated in a study from Vietnam, where the perceived relevance of the content of training for health workers' daily practice was related to their motivation [211]. These findings strengthen the theory that choice of topic is important for collaborative QI, and also as an attribute of innovations such as a CPGs. Implementation of a topic is easier if it is in line with existing practice, rather than something perceived to be new and unknown [143, 144].

The integrated approach of the EQUIP intervention, through its focus on all mothers and newborns rather than a selected patient group, such as those who are infected with HIV, was another aspect which met the perceived needs of health workers. They expressed that they sometimes experienced a tension between having to manage *all* patients and conditions, while many programs would only focus on one or two areas of care [212].

Health workers strongly expressed the motivating effect of using run-charts to monitor progress in health facilities. As a standalone intervention, run-charts have been found to have positive effects on health worker motivation also in high-income settings [213]. In a QI initiative in a Rwandan district hospital, making data visible on run-charts in the staff room was identified as one of the key factor for success [214]. Run-charts have been described as useful and simplistic tools which can provide actionable information without the need for mathematical complexity [215]. Through the use of routine HMIS data, run-charts allows health workers to utilise and understand routinely collected data which may otherwise be kept hidden in registers. One of the challenges in improving quality is to improve its measurements through routine documentation. The use of run-charts may therefore have dual benefits.

Contrary to the simplicity of run-charts, there is evidence from high-income settings that the understanding and use of PDSA-cycles is more complex, leading to inconsistent application [216-218]. In this thesis, health workers' understanding and reported use of PDSA-cycles varied substantially. A similar finding was made in another study of collaborative QI in the same region of Tanzania [200]. While it is possible that the use of PDSA-cycles to structure problem solving and testing of change ideas was appropriate for some QITs; it may have been more useful as a tool for the EQUIP mentors. There were few indications of their independent use by QITs in between mentoring and coaching sessions. This illustrates the importance of identifying the 'active' components of complex QI interventions such as the collaborative model used in EQUIP.

The level of senior support has been identified as a key determinant of health worker motivation and retention [88, 219, 220]. This was reflected in health workers' positive experiences of mentoring and coaching in EQUIP; an area of strong consensus and identified as the third component of the intervention that contributed to mechanisms of effect. The mentoring and coaching in the EQUIP intervention can be described as "task-focused" facilitation and as such has traits in common with the supportive supervision typically carried

out periodically in lower level facilities (health centres and dispensaries) in Tanzanian and other SSA health systems [144, 221]. Routine supervision is, however expected to fulfil a range of tasks and is often experienced by health workers as a control function [193, 222]. An analysis of survey data from multiple SSA countries could not established a positive correlation between the frequency and content of supervision and quality of maternal care [223]. This raises questions about the nature and quality of the reported supervision as opposite conclusions have been made by several other studies. A recent study from two Tanzanian hospitals found that the quality of supportive supervision, together with other aspects of management, can have an impact on health worker motivation and performance [224]. The same was found in a Rwandan study on improving quality of IMCI care [225], in a Nigerian study where significant improvements were achieved in service delivery for MNC through clinical mentoring as a single component intervention [226], and in India where mentoring significantly improved the skills and knowledge of labour and delivery nurses [227]. Our results mirror these findings and emphasise the importance of good quality supervision, or rather mentorship, as an important mechanism of effect to improve the quality of MNC in Tanzanian districts.

The other aspect of facilitation in EQUIP, the learning sessions, were rarely mentioned unprompted in the health worker interviews. This suggests a subordinate importance of these sessions compared to the mentoring and coaching visits to individual facilities. This was also found in the study of collaborative QI in the same geographical area, and similarly from high-income settings [200, 228]. This finding could inform a modification of the approach used in EQUIP which may be more feasible long term, as there are substantial costs and logistical challenges involved in bringing staff from different facilities together.

As WHO now introduces new standards for improving QoC for mothers and newborns in health facilities, it is important to understand the evidence base of the potential implementation strategies to achieve these standards. The findings from this thesis suggest that an effective approach could be to focus on reducing the unpredictability of health facility readiness, coupled with mentoring and coaching in individual health facilities and the use of data for locally generated run-charts. The application of PDSA-cycles in this setting may be less useful at the facility level, but its utility at the district, regional and national level, as suggested by the new WHO standards, remains to be evaluated.

9 METHODOLOGICAL CONSIDERATIONS

9.1 THE USE OF THEORY AND FRAMEWORKS

The studies within this thesis have used theory on different levels and for different purposes. The distinction between theories, models and frameworks is not always clear. Nilsen suggests that ‘*A “good theory” provides a clear explanation of how and why specific relationships lead to specific events*’ [140]. He then suggests that models are closely linked to theories but with a more narrow scope, focusing on description rather than explanation. Frameworks similarly do not provide explanations but are a way to structure various concepts and the relationships between them [140]. While the i-PARIHS framework, used in Study IV, has been categorised as a determinants framework, it does position the construct of *facilitation* as the active ingredient in implementation and as such approach an explanation, and therefore theory, of how successful implementation is to be achieved [140, 141].

While i-PARIHS was used for analysis, it was not used to develop the interview guide in Study IV. The results therefore did not reflect all relevant aspects of the framework. The use of i-PARIHS also presented a limitation in terms of the *recipients* construct. The recipients of EQUIP were conceptualised as the health workers but their accounts of interaction with mothers did not fit clearly within the framework constructs. For MNC in SSA, the interaction with mothers, families and communities is vital. As this aspect had been explored in Study III, information was not lost for the thesis, but may be important to take into account for future uses of i-PARIHS in this context.

The other theory used in Study IV was the program theory of how EQUIP in health facilities was envisaged to work. This was articulated in a detailed logic model, the importance of which has been emphasised for QI interventions [229]. The components of this logic model were linked both to the seven elements of collaborative QI [120], to help illustrate the underlying programme theory, and to the construct of the i-PARIHS framework [141], to illustrate how the intervention would be evaluated. This integration allowed the analysis to go beyond description to become more analytical.

For the assessment of CPGs in Study I, a framework outlining the specific attributes associated with guidelines’ implementability was used, focusing on those attributes directly expected to influence health workers’ use of guidelines. This was based on a more comprehensive framework by Gagliardi et al [143].

Increasing the explicit use of theory in both implementation and QI research has been propagated in order to enable more effective use of research findings, and to move away from mere description to a deeper understanding of how and why implementation works [132, 229].

9.2 TRIANGULATION WITHIN AND BETWEEN STUDIES

Triangulation; the process of comparing results between methods, sources of data, observer perspectives or theories; can enhance the validity of findings [174]. The first two types of triangulation was applied both within and between studies in this thesis.

The cross-country comparison in Study I triangulated results between the three study countries. This process strengthened the conclusions that the content of CPGs for maternal and newborn care in SSA is of good quality but that there is considerable variation in their levels of usability and applicability.

The results of limited health facility readiness in Tandahimba district could be triangulated between studies. The identification of health facility readiness as the largest implementation bottleneck in Study II was mirrored in health workers' perceptions of insufficient health facility readiness in Study III. As Study II indicated another pattern of bottlenecks in Newala district, additional interviews with health workers in Newala could have provided further strength to this evidence.

Interpreting the results from studies II and III from a different angle can, however, also raise the question of whether a cross-sectional bottleneck analysis is useful in the context of unpredictable availability of for example medicines. Repeat bottleneck analyses over time could assist in answering this question.

Study IV was not able to evaluate the effect of different QI interventions components quantitatively. Further research could address this.

9.3 QUALITATIVE METHODS

9.3.1 Sampling

In three of the studies in this thesis, respondents for interviews were sampled using purposive sampling; one of the most commonly applied approaches in qualitative research [170, 174]. In Study III and IV, the focus was on health worker perceptions in Tandahimba district. Sampling was conducted to achieve variability in the data, to obtain perspectives representing the range of cadres and levels of health facilities. For the process evaluation in Study IV, it was also important to interview health workers from facilities with varying performance. This sampling was guided by the EQUIP mentors' assessment of functionality of the QITs. This assessment was open to bias in terms of recall; did EQUIP mentors remember the characteristics of each QIT accurately? Also, it is plausible that the nature of the professional links between health workers and EQUIP mentors could skew the assessment. The analysis for Study IV, however, reinforced the EQUIP mentors assessment, in that there was variation in participation, experiences and understanding between high and low functionality health facilities.

A key limitation of the sampling for Study III was that theoretical sampling according to grounded theory methodology was not conducted, although analysis followed a grounded

theory approach. Theoretical sampling is a core aspect of grounded theory which relies on iterative data collection where results from analysis of an initial open sample directs further sampling of respondents [152]. The possibility of conducting repeat interviews, to allow for theoretical sampling, was discussed during the course of analysis and had been made possible if needed. The data collected was, however, assessed as rich enough to fill categories and answer questions raised during analyses.

Another concept originating from grounded theory is saturation [152]. This is a subjective assessment, implying that no new information relevant to the study objective appears through analysis of interviews and that sampling of respondents therefore can stop. Following this definition, saturation was perceived to have been reached in study III.

9.3.2 Credibility of findings

In qualitative research, the concepts of validity and reliability are generally not used. But the issue of whether the findings reflect, for example, the respondents' perceptions in an accurate way is important. This is sometimes referred to as credibility or trustworthiness [171]. In studies III and IV, a key consideration was to what extent health workers felt able to share their full experiences of providing care. One consideration was that they rarely expressed having ever provided sub-optimal care, despite their detailed descriptions of the unpredictable and often challenging conditions for care provision. This finding may be due to social desirability bias, of health workers wanting to make a good impression

In grounded theory, three criteria of trustworthiness are sometimes used: *fit*, *work* and *relevance* [177]. *Fit* describes whether the results of the study can be recognised by others with experience from the same field. *Work* is about whether the results provide meaning and coherence, and *relevance* is about whether the results are applicable in the setting where the study was conducted [177]. The resulting grounded theory should also contribute with new insights [177]. Based on the discussion of the finding of unpredictability in study III, these criteria have all been met, implying a high level of trustworthiness of the results.

9.3.3 Reflexivity

Reflexivity is integral to qualitative research. It involves reflecting on the researcher's role and how this may influence the formulation of research questions, data collection and analysis [174]. This is in some ways in opposition to the positivist paradigm which poses that there are scientific truths which can be discovered empirically with pure objectivity [174].

The background of the PhD student, as a medical doctor and having worked in rural Tanzania, clearly inspired the formulation of research questions and the focus on the perspective of health workers. This experience was also brought in to the interview process which could be conducted in Swahili and where rapport could be established with respondents. It is possible however, that social desirability bias of respondents' accounts could have been increased for these same reasons. The presence of a Tanzanian social

scientist as lead interviewer opened up for alternative perspectives as did the involvement of researchers with complementary backgrounds in the analysis of the transcripts.

9.4 QUANTITATIVE METHODS

9.4.1 Linking data from households and health facilities

The linking of data from households and health facilities in Study II was strengthened by the availability of data from the same districts and the same time period. However, there were limitations. Data between mothers' utilisation of care and the individual health facilities and health workers providing that care could not be linked. The linking was therefore ecological [98]. Compared to studies conducting this type of linking for example at the regional level, data from the same district should however result in more valid coverage estimates. Data in Study II also was stratified according to facility type (hospital, health centre and dispensary). The validity of coverage estimates would, however, be affected if large variations in health facility readiness or clinical practice existed between facilities of the same type.

Another challenge when linking data from households and health facilities is the time interval between surveys. Even though the data for the bottleneck analysis was from surveys conducted within the same time period, recall for the household survey means that mothers' reports on utilisation of care may have been for a different time period than the health facility assessments, possibly affecting the validity of the coverage measures.

9.4.2 Coverage estimates and the identification of bottlenecks

The approach to estimating coverage at different stages of implementation combines the concepts of systems effectiveness and bottleneck analysis. The interventions analysed in Study II were all preventive, making it possible to define a target population at the district level. However, interventions intended for particular target groups, for example underweight newborns, could not be included due to limited sample size and missing data. Another limitation is that the indicators used for coverage estimates reflected only the minimum conditions required for implementation. For example, AMTSL was judged to have been carried out if the health worker reported the administration of Oxytocin or Ergometrine; controlled cord traction and uterine massage were not considered. The indicators selected therefore affect the coverage estimates with potentials for both over- and underestimation of effective coverage.

In this thesis, bottlenecks were identified at the district level and inferences could not be made about bottlenecks for the different facility types. Differences in health facility readiness were, however, observed between health facility types suggesting that the possibility of identifying bottlenecks for each facility type may be important.

Lastly, bottlenecks were identified as the absolute attrition in coverage between one stage and the next of the implementation pathway. Looking at the relative attrition may be equally important.

9.4.3 Validity and Bias

The validity of indicators is a generic concern for all surveys especially when mothers themselves report on the care received during childbirth [95, 230]. The indicators used for AMTSL and use of a Partograph in Study II were generated from health worker reports on the actions taken during the last delivery they assisted. Such reports could be subject to a social desirability bias, and therefore result in overreporting of key interventions. The questions were, however, open ended and non-prompted which meant that health workers needed to remember the actions they had taken for a particular mother, possibly leading to underreporting.

9.5 GENERALISABILITY AND TRANSFERABILITY

Generalisability can be defined as “*the degree to which the results of an observation hold true in other settings*” [150]. While such considerations are also made in qualitative research, they are commonly referred to as transferability, defined as whether the findings are transferable, or relevant, to other settings [174].

In the mixed-methods multiple case study (Study I), the use of cross-country comparisons strengthened generalisability: the findings of content and format of CPGs may be similar in other SSA countries.

The results from Study II could be discussed both in terms of generalisability and transferability. In terms of generalisability, the quantitative results could be generalised to Tandahimba and Newala districts. It is possible that similar findings would be made in other districts with similar resource levels in Tanzania, but this cannot be supported by the evidence generated in this thesis. The *implementation pathway* as a model for estimating effective coverage and identifying bottlenecks, however, has a strong degree of transferability in that its application could be useful for any area of health care and in any setting.

While the concept of unpredictability emanated from qualitative research in one district only, it strongly resonates with empirical knowledge from other similar settings. It is therefore reasonable to assume that the concept of unpredictability is transferable to other areas of care in the same setting, to other Tanzanian districts and possibly, to other low resourced health systems in SSA. Further research can help to determine its importance.

The components of collaborative QI that satisfied the needs of health workers identified in Study IV are also likely transferrable to other settings, especially those with similar resource levels, characteristics of health workers and practices related to for example supervision.

9.6 GENDER

A gender analysis of a thesis focusing on QoC for mothers and their newborns is inevitable, given the fundamental gender inequalities in many countries in SSA [21]. WHO has defined gender as *“The socially constructed characteristics of women and men – such as norms, roles and relationships of and between groups of women and men; it varies from society to society and can be changed”* [231]. As mentioned in the background, gender inequality is a powerful determinant of both access to care, through for example lower levels of higher education and limited decision-power within households, and maternal health risk [19, 22]. It may also be an underlying determinant of inadequate resource allocation for maternal and newborn care, illustrated by Mahmoud Fathalla’s famous quote *‘Women are not dying because of diseases we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving’*[232]. Moreover, it influences resources spent on, the focus and processes of research [233].

The study area in southern Tanzania where the research was conducted has a matrilineal cultural tradition [163]; this likely affects access to care positively, putting more emphasis on the quality gap in this setting. The majority of interviews were conducted with female health workers. This is natural as the nursing/midwifery and auxiliary professions are mainly occupied by women [234]. The question is: does this have implications for how conditions are perceived or which components of collaborative QI meet the needs of health workers? Although the research in this thesis cannot provide any answers, it is interesting to consider whether the findings would have been different had a more balanced number of male and female health workers been interviewed. It is also possible that, if mothers and newborns were cared for by more male health workers, conditions may be different. Is it possible that the lack of resources for maternal and newborn care in rural health facilities reflect that both beneficiaries and the majority of health workers are female; this area of care therefore being subject to a double disadvantage?

10 CONCLUSIONS

Focusing on Tanzania, and primarily the perspective of health workers, the results from this thesis provides new knowledge that can inform current efforts to address the quality gap in maternal and newborn care in rural Sub Saharan Africa.

- In Burkina Faso, Ghana and Tanzania, the content of CPGs for maternal care correlated well with WHO guidelines, whereas their format was mixed, the majority assessed as having a low to medium usability and applicability, potentially limiting their use by health workers in practice. (Study I)
- Effective coverage of five key maternal and newborn health interventions was below fifty percent in two rural Tanzanian districts. The major implementation bottlenecks differed between districts (health facility readiness in Tandahimba and access in Newala), but were similar across four of the five interventions within districts. (Study II)
- Health workers perceived unpredictability as the fundamental condition for maternal and newborn care provision. The level of predictability was also perceived as a defining characteristics of good quality of care. (Study III)
- Three components of collaborative QI were interpreted as contributing to mechanisms of effect in rural Tanzanian health facilities: improvement topics with a high degree of fit with health worker responsibilities and existing practice; the use of run-charts to visualise progress; and regular mentoring and coaching visits to individual health facilities. (Study IV)

11 RECOMMENDATIONS

The insights gained in this thesis are of relevance for policy makers at global, national and local levels, for program developers and implementers, and for researchers.

MEASURE EFFECTIVE COVERAGE AND IDENTIFY THE LEVELS OF BOTTLENECKS IN DISTRICT HEALTH SYSTEMS

- Measures of effective coverage should be prioritised and complement other measures analysed by global and national policy makers to track progress towards closure of the quality gap in maternal and newborn care.
- Conditional stages of coverage in an implementation pathway can assist in characterising the quality gap and allow for identification of the levels of bottlenecks in health systems. Such analyses can be used by local policy makers, for example at the district level, to enable targeted analyses, planning and improvement.
- Research should assess the level of variability in district level bottlenecks over time to determine the utility of a cross-sectional as opposed to a longitudinal approach and its applicability for district level planning

ACKNOWLEDGE AND ADDRESS UNPREDICTABILITY OF HEALTH FACILITY READINESS

The inherent unpredictability within rural health services in SSA should be addressed to enable improvements in maternal and newborn care.

- At the national level, such efforts should include better coordination of external health programs and funding to ensure long term commitment to increase reliable availability of drugs, supplies and human resources. Development of national CPGs should acknowledge the unpredictable conditions for care provision and incorporate alternative protocols for clinical practice in such circumstances.
- At the level of program development and implementation, the dimension of unpredictability should be included in planning and evaluation. Acknowledging predictability as an outcome in its own right, could help to focus QI interventions on changes that can be supported reliably and sustained over time.
- Research could help to identify ways to measure and characterise different forms of unpredictability within health services. These measures could be used to evaluate the effect of unpredictability on health worker performance as a way to explore predictability as a dimension of quality of care.

KEEP THE FOCUS OF QI INTERVENTIONS ON THE HEALTH WORKERS' NEEDS FOR SUPPORT IN ORDER TO IMPROVE CLINICAL PRACTICE

QI interventions in rural health systems should identify and focus on those components and characteristics which meet the needs of health workers.

- At the global and national policy levels, and at the level of program developers and implementers; integration of QI interventions should be prioritised to avoid inefficiencies and confusion for health workers on the ground. Program developers and implementers should also ensure the use of QI tools which are easy to understand and apply, bearing in mind that health facilities in rural SSA are often staffed by health workers of lower cadres.
- At the national and local policy levels, and at the level of program developers; increased resources for regular supportive supervision, or mentoring and coaching, to lower level health facilities should be made available. Such supervision could act to catalyse QI in an integrated way and should benefit not only maternal and newborn care, but all aspects of health service provision in rural health facilities. The importance of having an experienced health worker in this role, who can give clinical support in settings where health workers often work alone, rather than a supervisor in a management position, should be recognised.
- At the national level, the development of CPGs for maternal and newborn care, should focus more on developing user-friendly formats to encourage use by health workers in practice.
- Research could evaluate the effect of discrete QI intervention components on clinical practice and effective coverage. Intervention studies could evaluate the feasibility and effectiveness of an integrated approach to supportive supervision for QI, across several areas of care in rural health facilities, on clinical practice and effective coverage of key health interventions.

12 ACKNOWLEDGEMENTS

The work of this thesis would not have been possible without the generosity of the people who shared their experiences and knowledge. I especially want to acknowledge the people and health workers of Tandahimba district who participated in the EQUIP surveys and in the interviews. Thank you for your time and for your commitment.

I have had a fantastic team of supervisors who have supported me in different ways and at different stages throughout this PhD.

Stefan Swartling Peterson: You have been an inspirational supervisor, a true systems-thinker with a wide angle view of global health. You have pushed me when I needed pushing and told me to focus on ‘good enough’ during difficult times. You even gave me much appreciated on-site supervision in Malawi!

Claudia Hanson: You have taught me so much about maternal and newborn health and given me confidence that my research has been relevant and rooted in the realities and needs on the ground. Your support in the final stages of writing this thesis has been invaluable.

Tanya Marchant: More than once you have saved me when I have needed someone to tell me to focus and limit the scope of my studies! I am very happy that our paths crossed again.

Fatuma Manzi: You were my vital link to the EQUIP team in Tanzania, made my field work possible and have been encouraging throughout.

Ingrid Hylander: You really opened the world of qualitative research for me and the sessions we’ve had together have been a true inspiration.

Thank you all so much!

Martine Billanou: My PhD mentor but foremost friend for over 20 years. You have inspired me in so many ways. From our early discussions in Asmara of what I should study at University, discussing Tanzanian development in your home in Dar es Salaam, to motivating me to pursue this PhD during times of doubt. Merci mon amie!

Many colleagues, peers and friends have contributed and helped along the way. A special thanks to *Göran Tomson* who gave me the opportunity to conduct the first study of this thesis and who helped me to finally (!) get registered for my PhD. Thank you to *Jaran Eriksen* for your calm and positive support during all stages of the work with the first study. Thank you *Anna Bergström*, my friend and colleague, for getting involved in my last study and guiding me through the field of implementation science. Thank you to my QUALMAT colleagues, especially *Rose Mpembeni* and *Siriël Massawe* at MUHAS and *Lars L Gustafsson* at KI. Thank you to all the colleagues in the EQUIP team, especially to *Arafumin Petro*, *Yovitha Sedekia*, *Jennie Jaribu*, *Godfrey Mbaruku*, *Silas Temu* and *Tara Tancred* in Tanzania, to *Peter Waiswa* and *Monika Okuga* in Uganda and to *Alex Rowe* at CDC. A special thank you to *Farida Hassan* at Ifakara Health Institute, it was a joy to do field work together with you!

Thank you *Helle Mölsted Alveesson* at PHS Global health, for the good discussions on qualitative methods (and the fun lunch breaks!). Thank you to *Peter Allebeck* for your support during my time at Social medicine and especially for giving me time to write on my PhD application.

Hans Rosling: Working with Hans from the early days of medical school convinced me that I had chosen the right path. He reminded me that life was a marathon and I am very sad that his is already over. I will continue to work in his spirit.

Thank you to *all* my colleagues and friends at PHS Global health/IHCAR and my fellow HSP research group members: you have given me support, feed-back, good conversations and fun during much needed coffee and lunch breaks over the years. A special thank you to *Cecilia Lindsjö* for all your help at the time of submitting my application to defend (from Malawi) and to *Helena Hildenwall* for your last minute help with gender analysis. Thank you also to all the great people at the PHS administration, especially *Gun-Britt Eriksson*, *Kersti Rådmark* and *Bo Planstedt* who have helped me out so many times over the years.

Thank you to all the colleagues at Husby Akalla vårdcentral, especially *Gungerd Rynde*, my clinical supervisor, for your understanding of my many interests and responsibilities, for always encouraging me and for being a fantastic role model! Thank you to my friend *Karin Buchanan* (we managed to share the same work place for a little while!) for your genuine passion for ‘glocal health’. Thanks also to Stockholms Läns Landsting for granting me time to pursue this PhD, to *Lasse Agréus* at former CEFAM for your openness to my area of research and seeing the synergies with family medicine, and to *Erik Lucht* for recruiting me back into clinical work.

Thank you to all my new colleagues at the Department of Family Medicine and the School of Public Health at the College of Medicine in Blantyre, Malawi: to *Martha Makwero* and *John Parks* for welcoming me to the department and giving me a new academic home which I soon hope to visit more often; to *Prosper Lutala* for involving me in the department’s research agenda; to *Barbara Swarthout* and *Miriam van Goor* for many supportive conversation; to *Rob Moodie* for encouraging me to present my work and for involving me in the leadership training; and to *Anna MacDonald* for your always encouraging feed-back. Special thanks to my friend and fellow PhD student *Jane Bates*, for many inspiring conversations and lots of fun, for immediate coffees and for all your support.

There are so many people without whose positive influence in my life the work of this PhD would never have materialised.

My grandparents: morfar Sture and mormor Margit: Their openness in getting to know people from all over the world opened it also for me. With stories from Tanzania and Egypt they inspired me to explore settings so different from the one where I was born. I miss them.

My parents: mamma och pappa: You brought me up to believe that I could do whatever I wanted. I'm not sure you have always understood what I have been up to (!) but your support has always been there. You have made this PhD possible in more ways than you know.

My siblings: Lovan and Kalle with families, thank you for your love, for visiting me in faraway places over the years and for making such wonderful cousins for Alva and Frida.

My Baker family: thank you for so many good discussions and much more.

Justin and Omega Maeda: You took me in to your family thinking that it was the most natural thing, and gave me the opportunity to work with UNICEF in Eritrea during a very important time in my life.

Dr Isiye Ndombi: You were my first doctor role model. You made me feel that the work I was doing in Eritrea was important and you inspired me to study medicine.

My colleagues from Peramiho hospital in Tanzania, especially Drs Mushi and Mushi, Dr Tonya, Mr Mapunda, Mama Komba and many more: The two years I had with you taught me so much, I could not have pursued this PhD without the knowledge I gained during that time. I am forever grateful and hope we will meet again.

Thanks to *all* my friends, none named, none forgotten, for your support, inspiration and laughter! A special thank you to *Cilla* for your help with the process of printing this thesis!

Tim, Alva and Frida: My wonderful, wonderful family. None of this would have been possible without your endless love and support. The last few weeks have been very intense. Tim: your input on my work and encouragement has been so important. Alva and Frida: the book is finished! I hope I have shown you that writing it has not just been hard but also fun. Let's get on with our adventures together in Malawi!

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14 ADDITIONAL FILE

INTERVIEW GUIDE USED FOR STUDY III AND IV

Part 1

Introduction

1. **Can you tell us a little bit about yourself; how you decided to become a health worker and how and when you came to work in this health facility?**

Interviewer: *We are interested to learn from your experiences of providing care for mothers and newborns in this facility, what works well and what problems you may have.*

(Bullet points only to be used as prompts if needed)

2. **To start with, could you tell us a little bit about your work load during the past week?**
 - Clinics held
 - Did anything special happen?
 - How many deliveries did you attend?
3. **Could you describe what usually happens during a delivery in this health facility?**
 - Who accompanies mothers to the health facility?
 - Routine examinations, interventions/drugs
 - How is the mother and newborn cared for after delivery?
 - Complications – referral. In which situations do you refer a mother or newborn? Can you give an example?
4. **Could you tell us about a recent situation where you felt you were able to give a mother or newborn good care/where everything went well?**
 - How were you able to help her? Did you get assistance?
 - What made you feel that you had provided good care?
 - How do you know if a mother is satisfied with the care she receives?
 - Do you ever get reports after the woman has left the facility? How?
5. **Could you tell us about a recent situation where you felt you were not able to give a mother or newborn all the services that you wanted to give them/a situation where you would have wanted to do more?**
 - In what way were you not able to give the care you wanted? What were the consequences?
 - What do you think were the reason for this?
 - What would you have needed to provide good care in this situation?

6. Thinking about these two examples; what do you feel are the main problems facing health workers in providing maternal and newborn care in Tandahimba district?

- What do you think are the reasons for these problems?
- How could these problems be reduced? By whom? With what resources?
- How can individual health workers contribute?
- If you have worked in a different district or health facility before – did you have the same problems there?
- If these problems were reduced (eg more health workers, equipment), what care would you be able to provide that you are not providing today?

Part 2

Interviewer: *Many programs work to improve health care in Tanzania. We would now like to learn from any experiences you may have of working with these programs*

7. Could you tell us about any projects that have worked in your health facility to improve care?

- What organisations? Ministry of Health?
- Areas of health care? (Maternal, HIV/AIDS, malaria, other)How often do you get visitors from these programs?
- What has been your experience of having multiple projects in your health facility?

Interviewer: *Since 2012, a program called EQUIP has been working in health facilities in this district. Have you heard of this program? Have these people talked to you when they come to your health facility?*

8. In what way have you participated in EQUIP?

- Can you describe any activities that you participated in?
- What was good or bad about these activities? Why?
- Can you describe anything new that you learnt during your work with EQUIP?
- Did anything surprise you during your work with EQUIP?

9. How would you explain the purpose of EQUIP to a new colleague?

- What is the aim of EQUIP?
- In what way is EQUIP trying to improve care?
- How is EQUIP different or similar to other programs you have worked with?
- Do you think you will continue with these activities
- What would you need to continue this work?

10. Do you see any changes in your daily work since EQUIP started? If so, please explain/give examples.

- Burden of work?
- What changes, if any, do you see in the provision of care?
- Can you give examples of any more improvements you would like to make?

Interviewer: *In order to understand more about how to improve quality of care, we are interested to hear about the work you did in EQUIP in a bit more detail.*

11. If not already covered: Can you describe the topics you have been working on in your health facility during EQUIP?

- i. Probe: List of topics from EQUIP
 - (Which topic(s) are you working on at the moment?)
 - Have you stopped working on any topics that you worked with before?

12. We would now like to go through each topic you have been working on:

a) Describe the change ideas you used to improve quality of care

- How did you select these change ideas and why?

b) In your opinion, have the change ideas been effective?

- If yes, why? How did they lead to an improvement?
- Can you give an example of how they have changed your work in the health facility?
- If no, why not? Why did they not lead to an improvement?

c) How did you conclude if the change idea was successful or not?

- Testing? Everyday practice?
- Can you show us any run-charts or PDSA cycles from your work with EQUIP and explain what they show? How would you use it?

d) Had you ever tried these change ideas before working with EQUIP?

- If yes: When /in what context? What were the results?
- If no: Had you tried anything else to solve the problem? Please explain.
What prevented you from trying these change ideas before?

Questions to ask at the end if not brought up by the respondent in previous answers:

13. During your work with EQUIP, have you ever seen a report card (show sample)?

- a. Can you explain what it shows?
- b. Have you used it in your work and in what way?

- 14. Have you attended any learning sessions/meetings with health workers from other facilities while working with EQUIP?** If so, what was your experience? What did you learn from the other health workers?
- 15. Have you cooperated with volunteers during your time in EQUIP?** What was your experience? What did you discuss with them?
- 16. Did you cooperate with the district team during your work with EQUIP – in what way?**

Interviewer: *We thank you very much for your time and the important experiences you have shared with us today. Is there anything more you would like to tell us or ask before we end the interview?*